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Forest Biomass and Empirical Yield for Kansas

W. Brad Smith and Ronald L. Hackett

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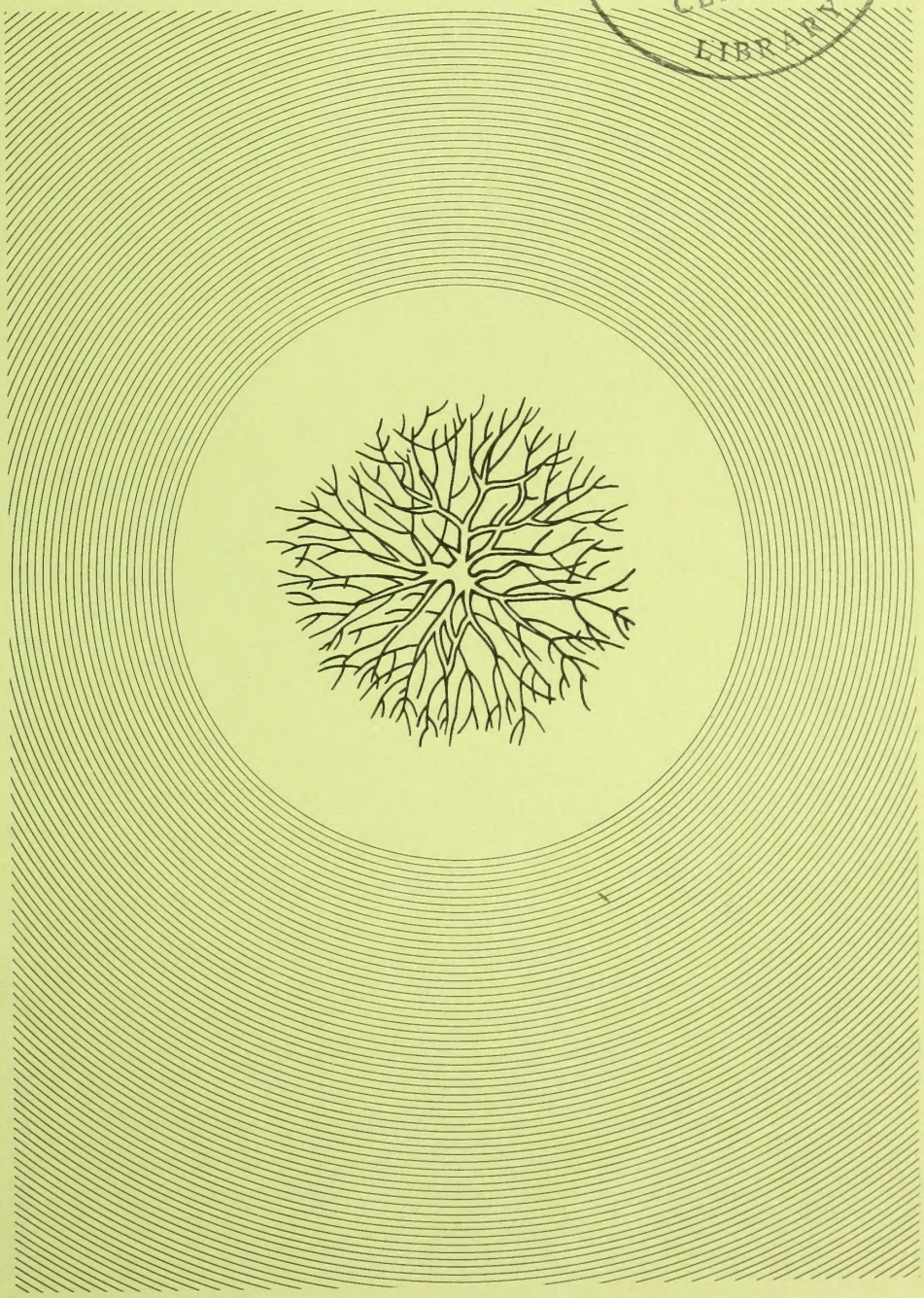

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FOREST BIOMASS AND EMPIRICAL YIELD FOR KANSAS, 1981

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FOREST BIOMASS

In 1981, Kansas' 1.2 million acres of commercial forest land supported 53.3 million green tons of tree biomass or 2.4 billion cubic feet. In addition to tree biomass, 6.7 million tons green weight of shrub biomass were estimated for the State.

Tree Biomass

Method

Tree biomass was estimated by the following method. First, net cubic foot volumes were converted to green tons using weight conversion factors for each species (Markwardt 1930). The weight of the bole bark was then computed using bark correction factors for individual species, the gross volume of the bole, and an average bark weight of 37 pounds per cubic foot. Tops and limbs for growing-stock and cull trees were estimated as 45 percent of the gross bole volume (Young *et al.* 1976). Finally, the biomass for trees less than 5 inches diameter breast height d.b.h. was computed from a regression equation fit to Young's tree weight table (Young *et al.* 1976). This regression equation uses d.b.h. to estimate total aboveground biomass as 80 percent of the above- and belowground biomass.

Findings

Tree biomass is composed of five components. Each component includes bark. Shown in the following tabulation are the five components and amount of biomass for each in Kansas.

Tree component	Kansas biomass (Million green tons)	(Percent)
1. 1- to 5-inch d.b.h. trees	7.7	14
2. *Growing-stock boles*—from a 1-foot stump to a variable 4-inch top diameter outside the bark.	22.9	43
3. *Growing-stock tops and limbs*—the volume above the variable 4-inch top, excluding the foliage.	11.2	21
4. *Cull boles*—from a 1-foot stump to a variable 4-inch top diameter outside the bark.	7.0	13
5. *Cull tops and limbs*—the volume above the variable 4-inch top, excluding the foliage.	4.5	9
All components	53.3	100

Forty-three percent of Kansas's tree biomass is in growing-stock boles. Growing-stock tops and limbs have the second most biomass with 21 percent (table 1).

Hardwood tree species compose more than 99 percent of the State's tree biomass. Select white oak is the most abundant tree species, accounting for 7.3 million green tons (14 percent) or 478 thousand cubic feet of the tree biomass (table 3). The second most abundant tree species is cottonwood with 6.8 million green tons (13 percent) or 294 thousand cubic feet. The tabulation on the following page, ranks the major hardwood groups.

Tree species[1]	Tree biomass (Million green tons)
Select white oak	7.3
Cottonwood	6.8
Hackberry	5.9
Other hardwoods	5.5
Elm	4.2
Ash	4.1
Black walnut	3.8
Select red oak	2.9
Noncommercial species[2]	2.6
Other red oak	2.0
Select hickory	1.9
Other white oak	1.6
Soft maple	1.1
Sycamore	1.0
Other hickory	0.9
Willow	0.8
Basswood	0.4
Eastern redcedar	0.3
Hard maple	0.2
Total	53.3

Shrub Biomass

Shrub biomass on Kansas' commercial forest land was also estimated in conjunction with the forest inventory.

Shrub species were placed into two categories to facilitate sampling—tall and low shrubs. Tall shrubs and trees less than 1 inch d.b.h. were tallied by stem diameter classes. This layer of vegetation is important for winter feed (browse) for wildlife, soil protection, and bird habitat. The low shrubs (ground cover species) were sampled by visually estimating the percent cover. Biomass estimates in weight per acre are shown in table 4.

Method

Stem diameters were measured 6 inches above ground level for all tall shrubs and for tree species less than 1 inch d.b.h. For low shrubs, a visual estimate of percent ground cover was made by species.

Biomass prediction equations (Telfer 1969, Grigal and Ohmann 1977, Ohmann *et al.* 1976, Brown 1976, Roussopoulos and Loomis 1979, Ohmann *et al.* 1981) were applied to shrubs and small tree species. From these equations, total plant biomass (green weight) was calculated by species, using either stem diameter (tall shrubs and trees) or percent ground cover (low shrubs) as a variable.

Findings

Willow forest type has the highest shrub biomass, totaling 2,786 pounds per acre green weight (table 4).

The following tabulation shows the significant amounts of shrub biomass by forest type.

Forest type	Tall and low shrub biomass (Green pounds/acre)
Willow	2,786
Eastern redcedar-hardwood	2,767
Upland elm-ash-locust	1,065
Oak-hickory	986
Lowland plains hardwoods	905
Elm-ash-cottonwood	742

Roughleaf dogwood, a tall shrub, yielded the highest weight of above-ground biomass per acre, especially in the willow forest type. In the low shrubs, buckbrush was the most abundant, occurring chiefly in the post-blackjack oak forest type.

Shown in the following tabulation are the most significant tall and low shrub species by forest type and their biomass:

Tall shrub species	Forest type	Shrub biomass (Green pounds/acre)
Roughleaf dogwood	Willow	1,778
Roughleaf dogwood	Eastern redcedar-hardwood	1,411
Beaked hazel	Eastern redcedar-hardwood	931
Willow	Willow	694
Low shrub species		
Buckbrush	Post-blackjack oak	186
Buckbrush	Upland plains hardwoods	166
Buckbrush	Upland elm-ash-locust	155
Buckbrush	Lowland plains hardwoods	150

Total Above-Ground Biomass

The cottonwood forest type has the highest amount of above-ground biomass with more than 150,000 green pounds per acre. The lowland plains hardwoods type is second with more than 96,000 green pounds per acre. The nonstocked category has the least amount with approximately 31,500 green pounds per

[1] *See* Principal Tree and Shrub Species Groups in Kansas *in Appendix A.*

[2] *See definition in Appendix A.*

acre. The tabulation below gives the tree and shrub biomass estimates by forest type.

Forest type	Tall shrubs	Low shrubs	Trees
		(Green pounds/ acre)	
Eastern redcedar-hardwood	2,707	60	41,663
Oak-hickory	834	152	94,917
Post-blackjack oak	200	194	92,696
Upland plains hardwoods	493	177	84,509
Elm-ash-cottonwood	582	160	87,719
Cottonwood	474	126	153,088
Willow	2,649	137	59,614
Lowland plains hardwoods	722	183	96,695
Upland elm-ash-locust	892	173	46,346
Nonstocked	189	69	31,226

EMPIRICAL YIELD TABLES FOR KANSAS

Empirical yield tables are useful to managers of timber, wildlife, and other forest resources who are interested in estimates of current commercial forest species composition and volume or in rough, short-term projections of future conditions.

Presented here are yield tables (Appendix C) compiled from data gathered on 636 commercial forest land plots established during the 1981 forest inventory of Kansas. Tables were compiled by forest type and stand-age class. Only tables having sufficient data, usually 3 or 4 plots, in each of two adjacent age classes, are presented; we feel that information based on smaller samples would not be useful.

The tables give the estimated merchantable cubic foot and board foot volume yield per acre from growing stock (including short-log trees) and sawtimber (including short-log trees) respectively and the average basal area per acre of all live trees by stand-age class for most of the forest types defined in Appendix A. These tables provide a detailed picture of stand composition as measured by growing-stock and short-log volume. Other tables show total green weight per acre of biomass for all live trees.

The tables were constructed by classifying the commercial forest land plots measured in the 1981 inventory by forest type and stand-age class. Then the per-acre merchantable cubic foot volume, board foot volume, or the total above-ground biomass was tabulated by species group. The merchantable volume standards used are minimum 5-inch d.b.h. to a 4-inch top diameter outside bark (top d.o.b.)with a 1 foot stump. Individual tree volumes were computed using a formula developed by (Gevorkiantz and Olsen (1955) and described by Smith and Weist 1982. A full explanation of the survey procedures and definitions can be obtained from Raile and Spencer 1982.

Overall, the tables presented in Appendix C give the resource manager an overview of the timber volume in Kansas on a per acre basis by forest type.

The volumes shown in these tables were obtained from plots located in stands with varying histories, from undisturbed stands to ones that had been cut repeatedly. Thus, standard errors of mean volume are given in the tables to indicate their variation. Sampling error in percent can be determined by dividing the standard error by the mean volume of all species; for example, the sampling error for total volume in the oak-hickory type in the 41-50 year age class (table 6) is 9.0 percent ((61/679) ×100).

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APPENDIX A

DEFINITIONS OF TERMS

Basal area.—The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land have the capability of producing in excess of 20 cubic feet per acre per year of annual growth under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.) Also see definition of pastured commercial forest land.

Commercial species.—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

Cull.—Portions of a tree that are unusable for industrial wood products, because of rot, form, or other defect.

Forest shrub.—A woody, perennial plant differing from a perennial herb in its persistent and woody stem(s), and less definitely from a tree in its lower stature and/or the general absence of a well-defined main stem. For this report shrubs were separated somewhat arbitrarily into tall and low shrubs as follows:

Tall shrubs.—Shrubs normally taller than 1.6 to 3.2 feet (0.5 to 1.0 meter).

Low shrubs.—Shrubs normally shorter than 1.6 to 3.2 feet (0.5 to 1.0 meter). (Woody perennial vines, such as grape, were included with low shrubs.)

Forest trees.—Woody plants having a well-developed stem and usually more than 12 feet in height at maturity.

Forest type.—A classification of forest land based upon the species forming a plurality of live tree stocking. Major forest types in Kansas are:

Eastern redcedar-hardwood.—Forests in which hardwoods comprise a plurality of the stocking but in which eastern redcedar comprises 25 percent or more of the stocking. Found on dry uplands, usually abandoned pastures or fields.

Oak-hickory.—Forests in which upland oaks (white, northern red, black) or hickory, singly or in combination, comprise a plurality of the stocking, except for stands classed as eastern redcedar-hardwood or as post-blackjack oak. Occurs on a variety of soils.

Post-blackjack oak.—Forests in which post oak or blackjack oak, singly or in combination, comprise a majority of the stocking. Occurs on dry uplands and ridges.

Upland plains hardwoods.—Forests in which black walnut, hackberry, and bur oak, singly or in combination, comprise a plurality of the stocking. Commonly found on slopes and uplands.

Elm-ash-cottonwood.—Lowland forest in which elm, ash, cottonwood, and willow, singly or in combination, comprise a plurality of the stocking, except for those in which cottonwood or willow comprise a majority of the stocking. Found on first or second bottoms of major streams.

Cottonwood.—Forests in which cottonwood comprises a majority of the stocking.

Willow.—Forests in which willow comprises a majority of the stocking.

Lowland plains hardwoods.—Forests in which black walnut, hackberry, bur oak, soft maple, and boxelder, singly or in combination, comprise a

plurality of the stocking. Commonly found in coves and bottomlands.

Upland elm-ash-locust.—Upland forests in which elm, ash, and honeylocust, singly or in combination, comprise a plurality of the stocking. Includes shelterbelts and windbreaks on sites drier than those commonly associated with lowland species.

Growing-stock trees.—Live trees of commercial species qualifying as desirable and acceptable trees. (Note: Excludes rough, rotten, and dead trees.)

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5 inches d.b.h. and over, from a 1-foot stump to a minimum 4-inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Cubic feet can be converted to cords by multiplying by 79 cubic feet per solid wood cord.

Hardwoods.—Dicotyledonous trees, usually broad-leaved and deciduous.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Poletimber trees.—Growing-stock trees of commercial species at least 5 inches in d.b.h., but smaller than sawtimber size.

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial forest land, but withdrawn from timber utilization through statute, administration regulation, designation, or exclusive use for Christmas-tree production, as indicated by annual shearing.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet Regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees.—(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, and/or do not meet Regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by Regional standards.

Sawtimber trees.—Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting Regional specifications for freedom from defect. Softwoods must be at least 9 inches in d.b.h. Hardwoods must be at least 11 inches in d.b.h.

Sawtimber volume.—Net volume of the saw log portion of live sawtimber in board feet, International ¼-inch rule, from stump to a minimum 7 inches top d.o.b. for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Short-log (rough tree).—Live trees of commercial species that contain one merchantable 8- to 11-foot saw log but not a 12-foot saw log or two noncontiguous saw logs 8- to 11-feet long, now or prospectively.

Site index.—An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

PRINCIPAL TREE AND SHRUB SPECIES GROUPS IN KANSAS[3]

TREE SPECIES

Softwoods
- Eastern redcedar ..... *Juniperus virginiana*

Hardwoods
- Select white oak
  - Bur oak ..... *Quercus macrocarpa*
  - White oak ..... *Quercus alba*
  - Chinkapin oak ..... *Quercus muehlenbergii*
- Other white oak
  - Post oak ..... *Quercus stellata*
- Select red oak
  - Northern red oak ..... *Quercus rubra*
  - Shumard oak ..... *Quercus shumardii*
- Other red oak
  - Black oak ..... *Quercus velutina*
  - Blackjack oak ..... *Quercus marilandica*
  - Pin oak ..... *Quercus palustris*
  - Shingle oak ..... *Quercus imbricaria*
- Select hickory
  - Pecan ..... *Carya illinoensis*
  - Shellbark hickory ..... *Carya laciniosa*

[3]*The common and scientific names of tree species are based on: Little, Albert L., Jr. Checklist of United States Trees (Native and Naturalized). Agric. Handb. 541. Washington, DC: U.S. Department of Agriculture; 1979. 375 p. The common and scientific names of shrubs are based on: Fernald, Merritt L. Gray's manual of Botany. New York, NY: American Book Company; 1950. 1,632 p.*

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Mockernut hickory ..... *Carya tomentosa*
Shagbark hickory ..... *Carya ovata*
Other hickory
Bitternut hickory ..... *Carya cordiformis*
Black hickory ..... *Carya texana*
Hard maple
Sugar maple ..... *Acer saccharum*
Soft maple
Silver maple ..... *Acer saccharinum*
Ash
Green ash ..... *Fraxinus pennsylvanica*
White ash ..... *Fraxinus americana*
Cottonwood
Eastern cottonwood ..... *Populus deltoides*
Willow
Black willow ..... *Salix nigra*
Basswood
American basswood ..... *Tilia americana*
Black walnut ..... *Juglans nigra*
Elm
American elm ..... *Ulmus americana*
Siberian elm ..... *Ulmus pumila*
Slippery elm ..... *Ulmus rubra*
Hackberry ..... *Celtis occidentalis*
Sycamore ..... *Platanus occidentalis*
Other hardwoods
Boxelder ..... *Acer negundo*
Black cherry ..... *Prunus serotina*
Black locust ..... *Robinia pseudoacacia*
Honeylocust ..... *Gleditsia triacanthos*
Kentucky coffeetree ..... *Gymnocladus dioicus*
Northern catalpa ..... *Catalpa speciosa*
Common persimmon ..... *Diospyros virginiana*
Red mulberry ..... *Morus rubra*
River birch ..... *Betula nigra*
Sugarberry ..... *Celtis laevigata*
Texas buckeye ..... *Aesculus glabra* var. *arguta*
Noncommercial species
Ailanthus ..... *Ailanthus altissima*
Eastern redbud ..... *Cercis canadensis*
Hawthorn ..... *Crataegus* spp.
Osage-orange ..... *Maclura pomifera*
Eastern hophornbeam ..... *Ostrya virginiana*

SHRUB SPECIES

Tall shrubs
Roughleaf dogwood ..... *Cornus drummondii*
Chokecherry ..... *Prunus virginiana*
Wild plum ..... *Prunus* spp.
Pawpaw ..... *Asimina triloba*
Beaked hazel ..... *Corylus cornuta*
Prickly ash ..... *Xanthoxylum americanum*
Viburnum ..... *Viburnum* spp.
Elder ..... *Sambucus* spp.
Sumac ..... *Rhus* spp.
Buttonbush ..... *Cephalanthus occidentalis*
Wahoo ..... *Euonymus atropurpureus*
Willow ..... *Salix* spp.
Sassafras ..... *Sassafras albidum*
Low shrubs
Virginia creeper ..... *Parthenocissus* spp.
Gooseberry-currant ..... *Ribes* spp.
Raspberry-blackberry ..... *Rubus* spp.
Rose ..... *Rosa* spp.
American bladdernut ..... *Staphylea trifolia*
Bilberry-blueberry ..... *Vaccinium* spp.
Honeysuckle ..... *Lonicera* spp.
Buckbrush ..... *Symphoricarpos* spp.
Poison ivy ..... *Rhus radicans*
Pipe-vine ..... *Aristolochia tomentosa*
Moonseed ..... *Menispermum canadense*
Greenbrier ..... *Smilax* spp.
Grape ..... *Vitis* spp.

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30./48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 pound = 0.454 kilogram.
1 ton = 0.907 metric ton.

APPENDIX B

BIOMASS TABLES

Table 1.--All live tree biomass weight by species group and tree biomass component, Kansas, 1981

(In green tons)

Species group	All components	Biomass component				
		1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
Eastern redcedar	327,473	185,195	76,966	39,582	16,506	9,224
Select white oak	7,258,998	303,255	3,425,768	1,694,337	1,147,605	688,033
Other white oak	1,602,916	302,447	722,386	337,549	149,595	90,939
Select red oak	2,940,607	127,093	1,626,511	806,614	199,869	180,520
Other red oak	1,951,281	113,136	995,059	513,525	194,493	135,068
Select hickory	1,910,715	269,215	961,548	454,587	136,856	88,509
Other hickory	926,926	207,121	429,551	199,223	58,796	32,235
Hard maple	246,808	80,305	100,799	51,224	9,013	5,467
Soft maple	1,069,121	37,415	568,119	280,018	98,492	85,077
Ash	4,063,618	643,970	1,798,134	950,412	395,050	276,052
Cottonwood	6,758,532	42,901	4,089,652	1,992,493	350,178	283,308
Willow	847,383	70,076	363,096	182,509	129,187	102,515
Basswood	386,444	71,834	160,590	78,287	45,154	30,579
Black walnut	3,756,931	462,570	1,810,684	897,619	359,420	226,638
Elm	4,249,130	1,675,863	954,679	460,438	716,885	441,265
Hackberry	5,858,598	897,608	2,696,133	1,312,562	589,163	363,132
Sycamore	1,035,946	36,229	621,590	293,367	45,665	39,095
Other hardwoods	5,472,704	1,079,314	1,391,436	682,228	1,379,817	939,909
Noncommercial species	2,613,645	1,077,736	--	--	1,013,171	522,738
All species	53,277,776	7,683,283	22,792,701	11,226,574	7,034,915	4,540,303

Table 2.--All live tree biomass volume by species group and tree biomass component, Kansas, 1981

(In thousand cubic feet)

Species group	All components	Biomass component				
		1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
Eastern redcedar	17,701	10,010	4,160	2,140	892	499
Select white oak	478,014	41,321	223,042	110,731	63,799	39,121
Other white oak	56,862	10,384	25,633	11,992	5,449	3,404
Select red oak	103,985	4,364	56,954	28,258	7,408	7,001
Other red oak	68,077	3,829	34,501	17,850	6,940	4,957
Select hickory	72,506	9,539	36,600	17,353	5,460	3,554
Other hickory	32,220	7,009	15,003	6,961	2,087	1,160
Hard maple	9,386	3,022	3,846	1,956	349	213
Soft maple	46,315	1,615	24,462	12,060	4,322	3,856
Ash	174,828	27,287	77,186	40,845	17,208	12,302
Cottonwood	294,105	1,818	177,508	86,499	15,405	12,875
Willow	36,529	2,917	15,540	7,815	5,658	4,599
Basswood	19,326	3,556	8,028	3,915	2,275	1,552
Black walnut	136,037	16,867	65,030	32,282	13,254	8,604
Elm	167,526	65,145	37,546	18,117	28,636	18,082
Hackberry	250,191	37,361	115,285	56,136	25,467	15,942
Sycamore	41,662	1,456	24,869	11,739	1,907	1,691
Other hardwoods	240,277	45,761	60,578	29,730	61,441	42,767
Noncommercial species	110,226	44,859	--	--	43,067	22,300
All species	2,355,773	338,120	1,005,771	496,379	311,024	204,479

Table 3.--All live tree biomass on commercial forest land by species group and forest type, Kansas, 1981

(In green tons)

Species	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
Eastern redcedar	327,473	191,845	40,070	--	28,064	4,008	--	--	29,936	28,607	4,943
Select white oak	7,258,998	91,752	4,673,485	31,917	331,122	440,157	--	--	1,557,223	97,346	35,996
Other white oak	1,602,916	38,832	467,252	1,073,883	19,513	--	--	--	--	3,436	--
Select red oak	2,940,607	4,037	2,375,982	67,344	43,040	131,694	--	--	213,358	101,190	3,962
Other red oak	1,951,281	--	1,542,203	166,773	23,692	79,286	1,794	--	95,554	26,937	15,042
Select hickory	1,910,715	7,190	1,490,954	22,309	24,027	200,292	--	--	105,367	57,197	3,379
Other hickory	926,926	--	518,191	19,908	49,021	88,421	--	--	243,396	7,989	--
Hard maple	246,808	--	147,954	--	--	68,317	--	--	10,448	20,089	--
Soft maple	1,069,121	--	20,155	--	--	772,645	13,213	--	249,481	10,270	3,357
Ash	4,063,618	8,210	477,086	--	58,152	2,492,180	85,263	11,814	685,297	196,554	49,062
Cottonwood	6,758,532	1,560	71,515	--	32,237	1,729,227	4,494,369	17,486	259,323	102,048	50,767
Willow	847,383	--	17,939	--	2,632	588,569	65,544	85,509	47,907	30,718	8,565
Basswood	386,444	--	171,258	--	77,858	27,178	43,118	--	42,362	24,670	--
Black walnut	3,756,931	52,690	766,988	17,073	401,339	369,970	28,655	--	1,932,843	178,600	8,773
Elm	4,249,130	39,858	717,096	14,107	187,401	1,466,383	60,844	3,221	989,815	631,686	138,719
Hackberry	5,858,598	16,942	396,428	4,240	339,359	977,604	51,832	358	3,865,563	171,587	34,685
Sycamore	1,035,946	--	146,290	--	15,292	343,938	16,250	--	477,916	30,488	5,772
Other hardwoods	5,472,704	21,463	423,971	7,972	181,870	2,204,373	350,246	6,802	1,542,446	536,062	197,499
Noncommercial species	2,613,645	98,496	560,570	6,633	272,761	717,505	1,519	--	507,371	300,481	148,309
All species	53,277,776	572,875	15,025,387	1,432,159	2,087,380	12,701,747	5,212,647	125,190	12,855,606	2,555,955	708,830

Table 4.--All live shrub biomass yields on commercial forest land by species group and forest type, Kansas, 1981

(In pounds per acre green weight)

Species	Forest type									
	Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
TALL SHRUBS										
Eastern redcedar	244	11	2	13	3	--	--	--	9	--
Boxelder	--	--	--	--	13	39	--	10	--	--
Silver maple	--	--	--	--	10	--	--	--	--	--
Sugar maple	--	3	--	--	2	--	--	--	5	--
Ailanthus	--	75	--	--	--	--	--	--	--	--
Bitternut hickory	--	14	5	12	--	--	--	8	--	--
Shagbark hickory	5	14	--	2	--	--	--	--	1	--
Hackberry	--	29	5	18	20	1	--	107	3	2
Eastern redbud	--	34	20	44	23	--	--	9	16	--
Roughleaf dogwood	1,411	215	55	164	253	239	1,778	173	561	92
Hawthorn	--	12	--	--	14	--	--	--	3	--
White ash	--	8	--	--	--	--	--	--	4	--
Green ash	--	118	1	12	19	82	--	136	15	--
Honeylocust	1	8	--	18	29	--	--	8	30	6
Black walnut	--	13	--	25	3	--	--	12	5	--
Osage-orange	--	5	--	28	1	--	--	--	7	6
Red mulberry	--	5	2	3	7	37	177	2	9	--
Eastern hophornbeam	--	18	4	3	--	--	--	--	--	--
Eastern cottonwood	--	--	--	--	4	--	--	--	--	--
Black cherry	--	3	--	11	--	--	--	--	1	3
Chokecherry	--	11	--	2	2	30	--	11	4	--
Wild plum	--	--	--	--	3	--	--	3	2	--
Pawpaw	--	7	--	15	2	--	--	21	--	--
White oak	--	--	46	--	--	--	--	--	--	--
Bur oak	--	4	1	1	--	--	--	4	--	--
Chinkapin oak	24	15	1	5	--	--	--	10	5	--
Northern red oak	5	8	8	--	--	--	--	2	8	--
Black oak	1	5	--	--	--	--	--	--	10	--
Beaked hazel	931	32	--	--	--	--	--	25	--	--
Prickly ash	--	--	--	30	58	--	--	--	3	--
Viburnum	--	5	--	1	--	--	--	--	--	--
Elder	--	6	--	--	19	--	--	--	--	--
Sumac	39	22	28	1	7	--	--	4	49	70
Buttonbush	--	--	--	--	2	--	--	--	--	--
Wahoo	--	4	--	--	--	--	--	2	--	--
Willow	--	--	--	--	29	28	694	1	--	3
Sassafras	--	2	--	--	--	--	--	--	--	--
American basswood	--	3	--	15	--	2	--	--	--	--
American elm	46	66	22	49	39	--	--	148	108	7
Siberian elm	--	5	--	--	--	--	--	--	--	--
Slippery elm	--	54	--	21	20	16	--	26	34	--
Total	2,707	834	200	493	582	474	2,649	722	892	189

(Table 4 continued on next page)

(Table 4 continued)

Species	Forest type									
	Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
LOW SHRUBS										
Virginia creeper	2	7	3	1	--	30	--	3	--	--
Gooseberry-currant	--	8	--	--	12	2	--	9	2	--
Raspberry-blackberry	--	--	1	--	--	--	8	1	3	--
Rose	--	3	--	--	1	--	--	--	6	4
American bladdernut	--	3	--	--	1	--	--	--	--	--
Bilberry-blueberry	--	2	--	--	--	--	--	--	--	--
Honeysuckle	--	--	--	7	7	13	--	6	2	--
Buckbrush	58	119	186	166	128	18	129	150	155	59
Poison ivy	--	6	2	2	10	58	--	8	4	6
Pipe-vine	--	--	2	1	--	--	--	--	--	--
Moonseed	--	4	--	--	1	--	--	3	--	--
Greenbrier	--	--	--	--	--	3	--	1	1	--
Grape	--	--	--	--	--	2	--	2	--	--
Total	60	152	194	177	160	126	137	183	173	69
All shrub species	2,767	986	394	670	742	600	2,786	905	1,065	258
Number of plots[1/]	20	265	26	42	206	32	4	213	90	33

[1/] Number of plots by forest type from which average yields were derived.

Table 5.--All live tree biomass yields on commercial forest land by species group and forest type, Kansas, 1981

(In pounds per acre green weight)

Species	Forest type									
	Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
Eastern redcedar	13,952	253	--	1,136	28	--	--	225	519	218
Select white oak	6,673	29,524	2,066	13,405	3,040	--	--	11,713	1,765	1,586
Other white oak	2,824	2,952	69,507	790	--	--	--	--	62	--
Select red oak	294	15,010	4,359	1,743	909	--	--	1,605	1,835	175
Other red oak	--	9,742	10,794	959	548	53	--	719	488	663
Select hickory	523	9,418	1,444	973	1,383	--	--	793	1,037	149
Other hickory	--	3,273	1,289	1,985	611	--	--	1,831	145	--
Hard maple	--	935	--	--	472	--	--	79	364	--
Soft maple	--	127	--	--	5,336	388	--	1,877	186	148
Ash	597	3,014	--	2,354	17,211	2,504	5,626	5,155	3,565	2,161
Cottonwood	113	452	--	1,305	11,942	131,993	8,327	1,951	1,850	2,236
Willow	--	113	--	107	4,065	1,925	40,718	360	557	377
Basswood	--	1,082	--	3,152	188	1,266	--	319	447	--
Black walnut	3,832	4,845	1,105	16,248	2,555	842	--	14,537	3,238	386
Elm	2,899	4,530	913	7,587	10,127	1,787	1,534	7,445	11,455	6,111
Hackberry	1,232	2,504	274	13,739	6,751	1,522	170	29,074	3,111	1,528
Sycamore	--	924	--	619	2,375	477	--	3,595	553	254
Other hardwoods	1,561	2,678	516	7,364	15,223	10,286	3,239	11,601	9,721	8,700
Noncommercial species	7,163	3,541	429	11,043	4,955	45	--	3,816	5,448	6,534
All species	41,663	94,917	92,696	84,509	87,719	153,088	59,614	96,695	46,346	31,226
Number of plots[1/]	20	265	27	42	206	37	4	213	90	33

[1/] Number of plots by forest type from which average yields were derived.

APPENDIX C

EMPIRICAL YIELD TABLES

Table 6.--Cubic foot volume per acre in growing-stock and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Oak-hickory forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	2	--	5	2	--	6	--	--	--	--	--
Select white oak	209	199	144	192	258	185	292	146	318	333	294
Other white oak	22	7	15	31	34	44	31	49	21	5	--
Select red oak	125	40	102	189	124	171	216	116	196	140	151
Other red oak	80	46	58	34	65	104	82	78	189	120	184
Select hickory	71	165	71	40	97	64	60	130	99	65	74
Other hickory	22	13	33	25	40	33	18	2	28	21	13
Hard maple	5	--	5	9	--	11	--	10	8	19	4
Soft maple	1	--	--	--	--	--	--	12	6	--	--
Ash	25	7	35	30	26	22	64	16	21	49	10
Cottonwood	5	3	--	12	3	--	11	--	--	14	--
Willow	1	--	--	--	3	--	5	--	--	--	5
Basswood	11	--	1	14	8	29	5	12	10	10	17
Black walnut	43	34	24	44	71	68	54	61	31	39	28
Elm	19	24	13	14	21	28	17	30	26	22	22
Hackberry	23	12	13	22	29	33	23	3	77	16	24
Sycamore	9	9	4	--	3	16	2	12	32	24	--
Other hardwoods	15	17	28	21	7	16	21	3	20	18	11
All species	688	576	551	679	789	830	901	680	1,082	895	837
Number of plots	252	14	20	22	27	24	25	17	18	20	11
Standard error	27	166	104	61	67	86	73	61	103	91	77
Average basal area	68	67	66	73	86	73	80	63	89	72	72

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 7.--Cubic foot volume per acre in growing-stock and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Post-blackjack oak forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Select white oak	18	--	84	--	83	--	--	19	--	--	--
Other white oak	473	225	427	626	396	337	431	555	--	201	--
Select red oak	34	--	66	11	104	--	--	--	--	405	--
Other red oak	76	152	50	102	44	--	56	35	--	--	--
Select hickory	11	--	--	14	--	--	43	8	--	--	--
Other hickory	5	--	--	--	--	--	47	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	--	--	--	--	--	--	--	--	--	--	--
Ash	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Basswood	--	--	--	--	--	--	--	--	--	--	--
Black walnut	9	--	17	3	--	--	38	10	--	--	--
Elm	1	--	--	--	--	26	--	--	--	--	--
Hackberry	2	--	--	--	--	--	--	20	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	6	--	--	--	--	--	--	28	--	66	--
All species	635	377	644	756	627	363	615	675	--	672	--
Number of plots	26	1	4	10	1	1	3	3	--	1	--
Standard error[3/]	60	R	144	114	R	R	153	126	--	R	--
Average basal area	80	82	102	89	71	56	60	74	--	71	--

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 8.--Cubic foot volume per acre in growing-stock and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Upland plains hardwoods forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	6	--	26	--	--	--	--	--	--	--	--
Select white oak	98	68	--	114	170	122	108	117	--	151	297
Other white oak	8	--	--	18	--	--	--	--	--	--	--
Select red oak	19	--	--	10	42	13	--	241	--	--	--
Other red oak	10	--	--	8	20	42	--	--	--	--	--
Select hickory	9	--	--	10	16	7	63	--	--	--	--
Other hickory	12	--	34	37	--	--	--	78	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	--	--	--	--	--	--	--	--	--	--	--
Ash	15	18	--	--	34	10	--	--	--	--	80
Cottonwood	13	--	--	--	--	27	--	--	--	--	175
Willow	1	--	--	11	--	--	--	--	--	--	--
Basswood	38	--	--	--	--	124	579	--	--	--	--
Black walnut	140	241	96	229	260	92	--	97	--	160	88
Elm	32	18	53	52	16	20	24	--	--	--	13
Hackberry	102	220	98	57	132	268	54	119	--	--	20
Sycamore	6	--	--	30	--	9	--	66	--	--	--
Other hardwoods	47	19	102	--	35	140	--	44	--	61	27
All species	556	584	409	576	725	874	828	762	--	372	700
Number of plots	39	3	5	4	5	6	1	1	--	1	2
Standard error[3/]	60	235	87	122	106	271	R	R	--	R	166
Average basal area	66	69	79	72	64	73	64	82	--	49	67

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 9.--Cubic foot volume per acre in growing-stock and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Elm-ash-cottonwood forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	4	--	--	--	--	--	--	--	--
Select white oak	27	4	20	30	26	31	23	75	94	36	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	9	9	8	--	19	12	--	30	--	--	--
Other red oak	5	6	--	--	--	18	--	5	--	--	--
Select hickory	13	7	14	--	36	11	26	17	--	--	--
Other hickory	6	--	5	5	7	6	--	--	--	--	--
Hard maple	4	--	--	--	--	8	--	32	--	--	--
Soft maple	73	5	--	51	101	88	200	58	254	139	--
Ash	145	95	198	295	215	147	301	164	171	192	--
Cottonwood	126	20	32	6	77	355	105	210	191	814	--
Willow	35	8	32	50	104	82	31	11	4	--	--
Basswood	2	--	--	17	--	2	--	9	--	--	--
Black walnut	23	20	18	50	26	37	19	16	9	63	--
Elm	59	73	34	36	61	95	96	81	14	25	--
Hackberry	62	68	39	146	122	54	69	68	22	45	--
Sycamore	34	25	18	--	47	82	84	37	28	--	--
Other hardwoods	91	86	107	187	117	187	140	34	76	65	--
All species	714	426	529	873	958	1,215	1,094	847	863	1,379	--
Number of plots	189	12	12	10	26	21	20	18	7	4	--
Standard error	48	70	111	208	131	196	132	123	324	432	--
Average basal area	66	59	78	65	84	84	81	79	65	81	--

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 10.--Cubic foot volume per acre in growing-stock and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Cottonwood forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Select white oak	--	--	--	--	--	--	--	--	--	--	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	--	--	--	--	--	--	--	--	--	--	--
Other red oak	1	13	--	--	--	--	--	--	--	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	2	--	--	30	--	--	--	--	--	--	--
Ash	26	--	--	28	--	18	25	61	23	93	--
Cottonwood	1,306	738	783	687	1,534	1,658	1,086	2,087	2,020	1,296	--
Willow	20	24	4	29	--	35	34	--	18	--	--
Basswood	3	--	--	--	--	--	--	57	--	--	--
Black walnut	10	--	--	--	--	38	--	--	--	--	--
Elm	16	--	--	--	--	36	--	82	27	--	--
Hackberry	7	--	--	--	--	23	--	--	--	10	--
Sycamore	6	--	--	--	--	6	--	--	49	--	--
Other hardwoods	21	--	--	--	21	31	18	99	--	24	--
All species	1,418	775	787	774	1,555	1,845	1,163	2,386	2,137	1,423	--
Number of plots	35	2	3	2	3	9	5	2	3	4	--
Standard error	166	131	266	328	504	377	455	713	565	363	--
Average basal area	90	73	65	68	86	100	76	154	105	114	--

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 11.--Cubic foot volume per acre in growing-stock and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Lowland plains hardwoods forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	1	--	3	--	--	--	1	--	--	--	--
Select white oak	93	17	35	96	50	91	131	270	120	282	400
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	13	--	8	--	27	17	13	14	20	28	--
Other red oak	5	--	--	5	4	7	--	6	--	17	--
Select hickory	6	--	14	--	13	12	--	6	4	--	--
Other hickory	16	--	58	14	26	7	13	21	17	--	--
Hard maple	1	--	--	--	4	--	--	--	--	--	--
Soft maple	22	--	--	--	45	56	12	6	27	--	--
Ash	41	--	26	35	64	50	47	80	40	43	--
Cottonwood	17	29	11	--	21	12	10	--	48	125	--
Willow	2	--	12	--	3	--	6	--	--	--	--
Basswood	3	--	3	--	--	--	5	10	--	8	--
Black walnut	132	94	218	163	198	165	121	37	90	88	62
Elm	36	35	40	22	37	40	41	37	51	92	49
Hackberry	267	127	210	193	275	277	362	547	281	437	350
Sycamore	43	27	19	--	44	44	85	13	75	--	207
Other hardwoods	63	19	93	118	67	76	87	56	29	18	--
All species	761	348	750	646	878	854	934	1,103	802	1,138	1,068
Number of plots	205	10	17	9	29	35	37	11	17	6	2
Standard error	31	45	56	109	68	76	71	138	80	233	501
Average basal area	72	51	82	67	77	75	81	86	69	95	88

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 12.--Cubic foot volume per acre in growing-stock and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Upland elm-ash-locust forest type - All site index classes

(In cubic feet per acre)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	6	29	15	53	--	--	--	--	--	--	--
Select white oak	12	--	38	58	--	82	11	83	--	--	--
Other white oak	1	--	--	--	--	--	13	--	--	--	--
Select red oak	16	8	--	--	--	387	11	220	--	--	--
Other red oak	4	--	9	--	--	71	--	--	27	--	--
Select hickory	9	--	--	71	--	103	--	33	76	--	--
Other hickory	2	--	--	--	--	81	12	--	--	--	--
Hard maple	5	--	--	--	--	401	--	--	--	--	--
Soft maple	3	--	--	--	--	--	--	--	--	--	--
Ash	19	--	6	--	--	--	68	183	--	--	--
Cottonwood	13	18	19	--	--	--	51	--	--	--	330
Willow	3	--	--	--	--	--	21	--	--	--	--
Basswood	8	--	--	--	--	547	--	38	--	--	--
Black walnut	30	10	75	181	33	83	22	21	99	--	--
Elm	39	34	24	165	160	--	130	51	45	--	48
Hackberry	15	28	43	--	45	--	30	--	--	--	149
Sycamore	7	--	--	--	--	--	65	28	--	--	--
Other hardwoods	57	42	145	--	214	--	8	26	455	--	432
All species	249	169	374	528	452	1,755	442	683	702	--	959
Number of plots	83	8	8	1	3	1	4	2	2	--	1
Standard error[3/]	31	44	76	R	145	R	79	358	292	--	R
Average basal area	43	36	76	68	65	82	66	75	83	--	68

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 13.--Board foot volume per acre in sawtimber and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Oak-hickory forest type - All site index classes

(In board feet per acre)[2/]

Species group	Average[3/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	6	--	--	--	--	25	--	--	--	--	--
Select white oak	709	288	295	414	677	628	1,185	549	1,382	1,565	1,060
Other white oak	43	21	--	--	40	166	37	135	97	7	--
Select red oak	500	169	324	599	342	708	945	580	994	625	587
Other red oak	363	153	125	48	294	373	397	441	1,076	517	1,166
Select hickory	180	270	118	61	86	255	162	604	316	183	160
Other hickory	49	18	42	--	50	37	19	--	76	268	82
Hard maple	12	--	12	19	--	40	--	31	13	31	--
Soft maple	8	--	--	--	--	--	--	79	32	--	--
Ash	61	37	--	13	51	26	264	60	52	135	30
Cottonwood	21	16	--	53	13	--	53	--	--	46	--
Willow	3	--	--	--	14	--	--	--	--	--	24
Basswood	41	--	7	41	16	104	12	64	42	50	35
Black walnut	116	55	14	59	204	189	236	175	66	119	119
Elm	36	29	16	5	35	74	36	85	70	22	59
Hackberry	73	22	96	28	110	148	49	14	205	58	36
Sycamore	43	--	23	--	13	62	18	67	179	100	--
Other hardwoods	42	44	55	54	14	36	90	--	51	71	59
All species	2,306	1,122	1,127	1,394	1,959	2,871	3,503	2,884	4,651	3,797	3,417
Number of plots	252	14	20	22	27	24	25	17	18	20	11
Standard error	123	378	229	288	307	378	362	336	581	402	487
Average basal area	68	67	66	73	86	73	80	63	89	72	72

[1/] Forest type definitions and species group list are in Appendix A.

[2/] International 1/4-inch rule.

[3/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 14.--Board foot volume per acre in sawtimber and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Post-blackjack oak forest type - All site index classes

(In board feet per acre)[2/]

Species group	Average[3/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Select white oak	27	--	59	--	164	--	--	97	--	--	--
Other white oak	755	--	300	403	645	837	2,068	1,816	--	779	--
Select red oak	87	--	--	--	465	--	--	--	--	1,800	--
Other red oak	126	174	--	199	244	--	--	76	--	--	--
Select hickory	51	--	--	42	--	--	303	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	--	--	--	--	--	--	--	--	--	--	--
Ash	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Basswood	--	--	--	--	--	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Elm	3	--	--	--	--	80	--	--	--	--	--
Hackberry	12	--	--	--	--	--	--	99	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	10	--	--	--	--	--	--	--	--	247	--
All species	1,071	174	359	644	1,518	917	2,371	2,088	--	2,826	--
Number of plots	26	1	4	10	1	1	3	3	--	1	--
Standard error[4/]	195	R	211	226	R	R	282	564	--	R	--
Average basal area	80	82	102	89	71	56	60	74	--	71	--

[1/] Forest type definitions and species group list are in Appendix A.

[2/] International 1/4-inch rule.

[3/] Average column based on weighted average over all plots including those aged 1-20 years.

[4/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 15.--Board foot volume per acre in sawtimber and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Upland plains hardwoods forest type - All site index classes

(In board feet per acre)[2/]

Species group	Average[3/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Select white oak	327	--	--	410	766	384	486	653	--	627	1,263
Other white oak	35	--	--	--	--	--	--	--	--	--	--
Select red oak	72	--	--	--	80	78	--	1,667	--	--	--
Other red oak	46	--	--	45	64	213	--	--	--	--	--
Select hickory	27	--	--	--	93	38	364	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	--	--	--	--	--	--	--	--	--	--	--
Ash	36	--	--	--	133	51	--	--	--	--	--
Cottonwood	70	--	--	--	--	139	--	--	--	--	945
Willow	--	--	--	--	--	--	--	--	--	--	--
Basswood	173	--	--	--	--	643	2,895	--	--	--	--
Black walnut	358	631	195	261	1,053	581	--	--	--	210	--
Elm	60	--	--	96	--	97	--	--	--	--	73
Hackberry	291	464	436	--	496	842	--	254	--	--	--
Sycamore	27	--	--	104	--	43	--	377	--	--	--
Other hardwoods	108	--	41	--	--	577	--	--	--	283	136
All species	1,630	1,095	672	916	2,685	3,686	3,745	2,951	--	1,120	2,417
Number of plots	39	3	5	4	5	6	1	1	--	1	2
Standard error[4/]	268	704	324	482	521	942	R	R	--	R	734
Average basal area	66	69	79	72	64	73	64	82	--	49	67

[1/] Forest type definitions and species group list are in Appendix A.

[2/] International 1/4-inch rule.

[3/] Average column based on weighted average over all plots including those aged 1-20 years.

[4/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 16.--Board foot volume per acre in sawtimber and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Elm-ash-cottonwood forest type - All site index classes

(In board feet per acre)[2/]

Species group	Average[3/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Select white oak	124	19	36	223	102	143	120	366	536	100	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	46	12	--	--	99	79	--	163	--	--	--
Other red oak	19	33	--	--	--	46	--	25	--	--	--
Select hickory	54	29	29	--	174	52	114	77	--	--	--
Other hickory	18	--	--	--	20	24	--	--	--	--	--
Hard maple	9	--	--	--	--	--	--	71	--	--	--
Soft maple	299	29	--	173	350	409	756	215	1,333	482	--
Ash	461	133	228	1,274	679	458	1,071	613	876	450	--
Cottonwood	596	99	180	28	413	1,734	512	805	1,098	4,371	--
Willow	149	--	88	207	463	379	145	57	--	--	--
Basswood	12	--	--	84	--	17	--	48	--	--	--
Black walnut	61	63	12	151	91	74	75	41	48	198	--
Elm	125	149	91	77	143	225	354	133	68	--	--
Hackberry	176	161	117	567	336	138	198	207	47	128	--
Sycamore	176	104	78	--	192	479	469	244	152	--	--
Other hardwoods	216	45	138	499	308	503	398	78	337	235	--
All species	2,541	876	997	3,283	3,370	4,760	4,212	3,143	4,495	5,964	--
Number of plots	189	12	12	10	26	21	20	18	7	4	--
Standard error	214	248	234	853	487	981	627	383	1,842	2,112	--
Average basal area	66	59	78	65	84	84	81	79	65	81	--

[1/] Forest type definitions and species group list are in Appendix A.

[2/] International 1/4-inch rule.

[3/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 17.--Board foot volume per acre in sawtimber and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Cottonwood forest type - All site index classes

(In board feet per acre)[2/]

Species group	Average[3/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Select white oak	--	--	--	--	--	--	--	--	--	--	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	--	--	--	--	--	--	--	--	--	--	--
Other red oak	--	--	--	--	--	--	--	--	--	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	9	--	--	152	--	--	--	--	--	--	--
Ash	41	--	--	--	--	58	--	--	102	152	--
Cottonwood	5,693	462	1,239	1,830	6,220	7,487	5,299	8,059	11,041	7,227	--
Willow	51	--	--	147	--	73	165	--	--	--	--
Basswood	--	--	--	--	--	--	--	--	--	--	--
Black walnut	13	--	--	--	--	49	--	--	--	--	--
Elm	22	--	--	--	--	86	--	--	--	--	--
Hackberry	23	--	--	--	--	89	--	--	--	--	--
Sycamore	22	--	--	--	--	--	--	--	253	--	--
Other hardwoods	20	--	--	--	--	45	--	--	--	77	--
All species	5,894	462	1,239	2,129	6,220	7,887	5,464	8,059	11,396	7,456	--
Number of plots	35	2	3	2	3	9	5	2	3	4	--
Standard error	833	186	782	1,024	2,823	1,678	2,233	2,067	2,556	2,145	--
Average basal area	90	73	65	68	86	100	76	154	105	114	--

[1/] Forest type definitions and species group list are in Appendix A.

[2/] International 1/4-inch rule.

[3/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 18.--Board foot volume per acre in sawtimber and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Lowland plains hardwoods forest type - All site index classes

(In board feet per acre)[2/]

Species group	Average[3/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Select white oak	464	84	234	316	228	452	676	1,404	578	1,345	2,110
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	52	--	17	--	101	51	59	72	78	164	--
Other red oak	21	--	--	--	23	24	--	32	--	96	--
Select hickory	15	--	19	--	12	51	--	25	24	--	--
Other hickory	38	--	83	49	52	23	32	68	86	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	90	--	--	--	168	238	59	32	71	--	--
Ash	151	--	32	34	248	204	186	360	113	244	--
Cottonwood	86	71	56	--	113	62	43	--	265	624	--
Willow	7	--	5	--	15	--	22	--	--	--	--
Basswood	7	--	--	--	--	--	13	--	--	59	--
Black walnut	437	254	303	457	614	661	521	187	330	291	449
Elm	97	28	42	60	82	140	120	101	179	237	110
Hackberry	937	188	509	756	873	1,010	1,366	1,876	1,168	1,536	1,533
Sycamore	206	108	82	--	221	186	456	43	332	--	1,099
Other hardwoods	175	--	222	351	249	209	227	226	130	9	--
All species	2,783	733	1,604	2,023	2,999	3,311	3,780	4,426	3,354	4,605	5,301
Number of plots	205	10	17	9	29	35	37	11	17	6	2
Standard error	140	173	213	435	338	309	317	739	389	783	2,555
Average basal area	72	51	82	67	77	75	81	86	69	95	88

[1/] Forest type definitions and species group list are in Appendix A.

[2/] International 1/4-inch rule.

[3/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 19.--Board foot volume per acre in sawtimber and short-log trees by species group and stand-age class, Kansas, 1981[1/]

Upland elm-ash-locust forest type - All site index classes

(In board feet per acre)[2/]

Species group	Average[3/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	9	94	--	--	--	--	--	--	--	--	--
Select white oak	70	--	370	107	--	439	--	397	--	--	--
Other white oak	4	--	--	--	--	--	76	--	--	--	--
Select red oak	48	36	--	--	--	874	86	833	--	--	--
Other red oak	15	--	43	--	--	393	--	--	148	--	--
Select hickory	24	--	--	323	--	449	--	--	296	--	--
Other hickory	3	--	--	--	--	--	67	--	--	--	--
Hard maple	12	--	--	--	--	1,022	--	--	--	--	--
Soft maple	5	--	--	--	--	--	--	--	--	--	--
Ash	24	--	--	--	--	--	41	195	--	--	--
Cottonwood	40	85	67	--	--	--	252	--	--	--	714
Willow	7	--	--	--	--	--	115	--	--	--	--
Basswood	38	--	--	--	--	2,733	--	191	--	--	--
Black walnut	72	--	186	265	--	425	39	110	288	--	--
Elm	50	--	34	539	407	--	196	--	--	--	--
Hackberry	29	27	103	--	116	--	--	--	--	--	261
Sycamore	27	--	--	--	--	--	244	133	--	--	--
Other hardwoods	142	59	333	--	868	--	--	--	1,215	--	1,251
All species	619	301	1,136	1,234	1,391	6,335	1,116	1,859	1,947	--	2,226
Number of plots	83	8	8	1	3	1	4	2	2	--	1
Standard error[4/]	107	109	437	R	510	R	419	845	472	--	R
Average basal area	43	36	76	68	65	82	66	75	83	--	68

[1/] Forest type definitions and species group list are in Appendix A.

[2/] International 1/4-inch rule.

[3/] Average column based on weighted average over all plots including those aged 1-20 years.

[4/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 20.--Biomass yields per acre in all live trees by species group and stand-age class, Kansas, 1981[1/]

Oak-hickory forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	281	--	254	198	692	346	99	--	--	--	--
Select white oak	29,758	31,057	26,048	28,469	36,766	25,400	40,142	17,431	40,920	41,086	36,682
Other white oak	3,061	854	4,927	3,491	4,444	5,197	3,586	5,388	3,167	558	--
Select red oak	15,493	6,041	13,434	22,446	15,596	23,389	24,093	15,805	21,616	17,111	17,636
Other red oak	10,321	9,260	7,816	4,345	7,689	12,419	9,375	10,351	23,226	15,617	21,445
Select hickory	9,678	20,716	9,719	4,683	15,209	8,013	7,209	16,344	12,316	8,001	9,771
Other hickory	3,358	2,276	4,183	5,186	5,800	4,196	2,827	713	3,404	2,688	3,009
Hard maple	1,000	--	861	1,355	--	2,590	588	2,445	1,230	1,868	2,453
Soft maple	148	--	--	--	--	--	146	1,352	441	--	--
Ash	3,168	1,409	4,364	5,576	3,257	2,961	6,176	2,455	2,674	5,452	1,184
Cottonwood	469	286	--	1,144	254	--	953	--	--	1,231	--
Willow	122	--	--	--	257	--	676	--	--	99	453
Basswood	1,098	--	123	2,383	609	3,016	341	1,045	889	1,082	1,696
Black walnut	5,180	7,177	3,142	4,610	8,101	7,209	6,137	6,395	4,960	4,577	3,665
Elm	4,676	2,667	2,496	4,306	4,205	7,279	3,761	6,168	6,794	6,987	5,171
Hackberry	2,612	1,677	1,453	2,194	3,054	3,611	3,267	269	7,996	2,190	2,829
Sycamore	979	747	380	--	380	1,322	214	1,262	2,724	2,299	242
Other hardwoods	2,854	4,289	5,202	2,450	2,610	2,002	4,006	2,106	3,281	3,512	1,360
Noncommercial species	3,633	3,817	9,325	1,036	5,040	5,497	2,096	5,061	5,304	2,054	2,775
All species	97,889	92,273	93,727	93,872	113,963	114,447	115,692	94,590	140,942	116,412	110,371
Number of plots	252	14	20	22	27	24	25	17	18	20	11
Standard error	3,099	17,542	14,284	7,333	7,902	10,534	8,092	6,840	9,339	11,167	7,745
Average basal area	68	67	66	73	86	73	80	63	89	72	72

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 21.--Biomass yields per acre in all live trees by species group and stand-age class, Kansas, 1981[1/]

Post-blackjack oak forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Select white oak	2,117	--	9,985	--	8,860	--	--	2,080	--	--	--
Other white oak	69,908	75,000	72,955	90,302	41,660	45,060	54,647	69,440	--	41,560	--
Select red oak	4,361	--	6,610	1,094	25,020	--	--	--	--	50,980	--
Other red oak	10,912	23,780	11,645	11,776	12,400	--	6,273	3,780	--	4,760	--
Select hickory	1,448	--	--	2,050	--	--	4,567	1,147	--	--	--
Other hickory	1,320	--	1,040	--	--	--	8,080	1,973	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	--	--	--	--	--	--	--	--	--	--	--
Ash	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Basswood	--	--	--	--	--	--	--	--	--	--	--
Black walnut	1,123	--	2,690	312	--	--	4,133	973	--	--	--
Elm	897	--	--	494	--	3,140	1,593	3,487	--	--	--
Hackberry	281	--	--	--	--	--	--	2,433	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	495	--	--	--	--	--	--	2,440	--	5,540	--
Noncommercial species	424	--	--	580	--	--	1,267	473	--	--	--
All species	93,286	98,780	104,925	106,608	87,940	48,200	80,560	88,226	--	102,840	--
Number of plots	26	1	4	10	1	1	3	3	--	1	--
Standard error[3/]	6,241	R	13,826	10,398	R	R	20,443	9,062	--	R	--
Average basal area	80	82	102	89	71	56	60	74	--	71	--

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 22.--Biomass yields per acre in all live trees by species group and stand-age class, Kansas, 1981[1/]

Upland plains hardwoods forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	1,193	--	1,336	465	--	--	--	--	--	--	--
Select white oak	13,789	6,967	380	12,190	18,764	17,947	11,400	12,100	--	23,460	33,710
Other white oak	864	--	--	1,900	--	--	--	--	--	--	--
Select red oak	1,966	--	--	1,090	4,480	1,407	--	25,800	--	--	--
Other red oak	1,166	--	--	1,035	2,704	4,637	--	--	--	--	--
Select hickory	1,112	--	--	2,030	1,684	807	6,700	--	--	--	--
Other hickory	1,649	--	4,204	4,690	148	63	4,820	9,180	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	--	--	--	--	--	--	--	--	--	--	--
Ash	2,534	8,587	--	1,625	4,788	1,763	--	--	--	--	7,020
Cottonwood	1,343	--	--	--	--	3,327	--	--	--	--	16,200
Willow	116	--	--	1,130	--	--	--	--	--	--	--
Basswood	3,790	--	--	--	--	12,653	54,040	--	--	--	--
Black walnut	16,783	22,560	10,720	22,085	25,660	9,387	3,940	13,340	--	15,380	8,010
Elm	7,609	12,113	17,464	12,385	2,120	5,867	2,320	16,640	--	--	4,720
Hackberry	14,429	42,753	11,336	6,010	18,624	30,273	5,540	11,400	--	2,880	4,960
Sycamore	624	--	--	2,650	--	1,333	--	5,720	--	--	--
Other hardwoods	7,764	2,847	17,856	2,470	5,064	21,400	--	3,980	--	5,080	3,640
Noncommercial species	10,530	21,420	19,032	1,955	16,004	--	--	--	--	7,320	7,510
All species	87,261	117,247	82,328	73,710	100,040	110,864	88,760	98,160	--	54,120	85,770
Number of plots	39	3	5	4	5	6	1	1	--	1	2
Standard error[3/]	6,914	29,862	13,517	9,266	19,931	32,391	R	R	--	R	32,770
Average basal area	66	69	79	72	64	73	64	82	--	49	67

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

Table 23.--Biomass yields per acre in all live trees by species group and stand-age class, Kansas, 1981[1/]

Elm-ash-cottonwood forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	37	--	358	--	--	--	--	--	--	--	--
Select white oak	3,393	1,077	2,112	3,300	3,150	3,299	2,413	11,129	9,969	3,845	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	1,077	967	760	--	2,018	1,286	470	3,469	--	--	--
Other red oak	649	800	--	--	--	1,880	278	536	--	--	--
Select hickory	1,813	692	4,673	--	4,496	1,155	2,848	1,854	--	--	--
Other hickory	842	--	1,973	502	712	706	--	--	--	--	--
Hard maple	530	--	--	--	--	770	--	4,047	--	--	--
Soft maple	6,987	793	--	4,190	8,675	9,065	20,225	4,777	23,197	12,765	--
Ash	16,657	12,647	26,883	32,886	23,790	16,085	30,527	18,093	19,037	23,065	--
Cottonwood	12,335	1,933	3,068	1,180	9,585	32,446	9,547	20,062	18,103	72,495	--
Willow	4,408	712	3,672	5,358	11,828	9,389	3,787	1,678	1,557	--	--
Basswood	257	--	--	1374	--	549	--	1044	--	--	--
Black walnut	2,946	3,045	2,812	5,640	2,570	4,059	1,871	2,462	874	9,830	--
Elm	11,743	14,530	8,957	6,960	9,891	16,564	13,374	14,294	3,766	7,250	--
Hackberry	7,987	6,808	6,697	16,424	15,141	7,661	8,438	8,116	2,806	5,940	--
Sycamore	3,051	2,210	1,508	--	4,020	8,087	7,056	3,311	2,280	--	--
Other hardwoods	15,786	17,522	21,268	27,660	18,585	26,606	22,272	9,606	11,683	11,520	--
Noncommercial species	5,419	7,778	14,192	2,054	1,147	3,609	2,819	2,948	--	4,050	--
All species	95,917	71,514	98,933	107,528	115,608	143,216	125,925	107,426	93,272	150,760	--
Number of plots	189	12	12	10	26	21	20	18	7	4	--
Standard error	4,749	9,267	15,712	19,632	13,783	16,790	13,760	14,521	29,513	27,426	--
Average basal area	66	59	78	65	84	84	81	79	65	81	--

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 24.--Biomass yields per acre in all live trees by species group and stand-age class, Kansas, 1981[1/]

Cottonwood forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Select white oak	--	--	--	--	--	--	--	--	--	--	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	--	--	--	--	--	--	--	--	--	--	--
Other red oak	80	1,400	--	--	--	--	--	--	--	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	687	--	5,613	3,610	--	--	--	--	--	--	--
Ash	2,630	--	--	2,490	--	2,078	3,352	5,880	2,007	8,460	--
Cottonwood	125,982	75,030	78,213	67,540	141,447	152,669	102,844	194,950	190,953	137,870	--
Willow	2,232	2,250	513	2,850	--	4,269	3,892	--	1,627	--	--
Basswood	2,241	--	--	--	--	--	--	39,220	--	--	--
Black walnut	1,375	--	--	--	--	5,347	--	--	--	--	--
Elm	2,829	--	--	--	8,427	4,153	--	13,280	2,560	525	--
Hackberry	2,216	--	--	--	3,607	7,024	--	--	--	880	--
Sycamore	792	5,020	--	--	--	533	--	--	4,293	--	--
Other hardwoods	9,624	2,060	4,260	9,610	10,153	6,787	5,648	34,770	6,233	20,260	--
Noncommercial species	71	--	--	--	--	--	--	--	--	625	--
All species	150,759	85,760	88,599	86,100	163,634	182,860	115,736	288,100	207,673	168,620	--
Number of plots	35	2	3	2	3	9	5	2	3	4	--
Standard error	16,661	25,900	31,490	37,040	47,376	37,776	43,030	83,480	45,846	43,237	--
Average basal area	90	73	65	68	86	100	76	154	105	114	--

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

Table 25.--Biomass yields per acre in all live trees by species group and stand-age class, Kansas, 1981[1/]

Lowland plains hardwoods forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	218	--	548	853	--	--	44	--	--	--	--
Select white oak	11,451	1,756	5,752	11,564	7,690	10,231	15,528	31,715	14,547	36,033	46,810
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	1,639	--	833	--	3,279	1,870	1,373	1,513	2,765	2,970	--
Other red oak	800	--	--	547	907	1,527	208	700	281	2,180	--
Select hickory	796	--	1,441	--	1,340	1,694	--	649	448	--	--
Other hickory	2,001	--	6,999	1,600	3,252	943	1,357	2,184	2,440	--	--
Hard maple	71	--	--	--	392	--	--	--	--	--	--
Soft maple	2,166	--	--	--	4,423	4,966	1,308	2,427	2,593	--	--
Ash	4,930	--	3,018	3,724	7,697	5,513	5,204	9,725	5,306	6,980	--
Cottonwood	1,735	2,512	1,106	--	1,914	1,550	1,206	--	5,026	10,620	--
Willow	408	1,774	1,574	473	524	--	535	--	--	--	--
Basswood	379	--	245	524	--	316	619	1,436	--	1,313	--
Black walnut	15,299	16,846	25,274	18,718	21,302	17,023	12,722	3,395	9,711	8,320	8,180
Elm	7,637	8,582	5,256	5,038	7,466	8,117	9,748	8,062	10,494	13,880	5,960
Hackberry	30,468	19,048	24,058	23,407	30,029	29,902	39,329	61,925	31,342	52,057	41,860
Sycamore	4,038	2,260	1,728	--	3,921	4,495	7,791	1,625	6,507	--	29,350
Other hardwoods	11,086	6,368	12,911	13,976	12,914	12,521	12,919	9,051	6,221	5,237	2,150
Noncommercial species	4,034	2,534	8,806	4,682	4,529	3,598	2,853	--	389	5,257	--
All species	99,156	61,680	99,549	85,106	111,579	104,266	112,744	134,407	98,070	144,847	134,310
Number of plots	205	10	17	9	29	35	37	11	17	6	2
Standard error	3,238	8,259	5,106	13,532	8,149	8,198	7,754	15,245	7,664	23,891	49,670
Average basal area	72	51	82	67	77	75	81	86	69	95	88

[1/]Forest type definitions and species group list are in Appendix A.

[2/]Average column based on weighted average over all plots including those aged 1-20 years.

Table 26.--Biomass yields per acre in all live trees by species group and stand-age class, Kansas, 1981[1/]

Upland elm-ash-locust forest type - All site index classes

(In pounds per acre green weight)

Species group	Average[2/]	Stand-age class (years)									
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121+
Eastern redcedar	531	1,557	1,010	7,120	--	--	--	--	--	--	--
Select white oak	1,999	--	5,475	25,560	--	8,960	1,160	10,790	--	--	--
Other white oak	67	--	--	--	--	--	1,395	--	--	--	--
Select red oak	2,101	913	--	--	--	47,200	1,845	23,420	--	--	--
Other red oak	515	--	988	--	--	9,780	--	--	2,950	--	--
Select hickory	1,037	--	--	7,240	--	16,140	--	4,240	9,530	--	--
Other hickory	177	--	--	--	--	8,340	1,240	710	--	--	--
Hard maple	500	--	--	--	--	41,520	--	--	--	--	--
Soft maple	215	--	--	--	--	--	--	--	--	--	--
Ash	4,005	--	1,035	740	--	--	9,660	24,480	--	--	--
Cottonwood	1,545	2,850	4,345	--	--	--	4,635	--	--	--	31,940
Willow	525	--	--	--	--	--	1,925	--	--	--	7,120
Basswood	593	--	--	--	--	43,260	--	2,960	--	--	--
Black walnut	3,419	955	6,897	17,700	4,153	7,600	2,175	3,290	10,280	--	--
Elm	10,900	14,660	7,945	19,140	14,893	--	26,665	20,950	13,060	--	4,300
Hackberry	3,494	3,008	5,793	5,660	4,213	--	10,850	--	--	--	14,080
Sycamore	552	--	--	--	--	--	5,350	2,600	--	--	--
Other hardwoods	10,298	5,037	28,685	--	35,880	--	2,630	4,230	49,830	--	47,620
Noncommercial species	5,513	10,978	16,400	--	22,007	9,320	7,515	--	5,690	--	--
All species	47,986	39,958	78,573	83,160	81,146	192,120	77,045	97,670	91,340	--	105,060
Number of plots	83	8	8	1	3	1	4	2	2	--	1
Standard error[3/]	4,181	7,733	10,815	R	27,265	R	9,548	23,490	34,340	--	R
Average basal area	43	36	76	68	65	82	66	75	83	--	68

[1/] Forest type definitions and species group list are in Appendix A.

[2/] Average column based on weighted average over all plots including those aged 1-20 years.

[3/] R indicates that there was an insufficient number of plots to compute the standard error.

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Forest biomass and empirical yield for Kansas. Resour. Bull. NC-81. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 32 p.

Methods for computing tree and shrub biomass. Presents empirical yield tables for cubic foot and board foot volume.

KEY WORDS: Tree weights, tops and limbs, tall shrubs, low shrubs, green tons, green pounds, cubic foot, board foot.

40th BIRTHDAY
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PREVENT FOREST FIRES

United States Department of Agriculture

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North Central Forest Experiment Station

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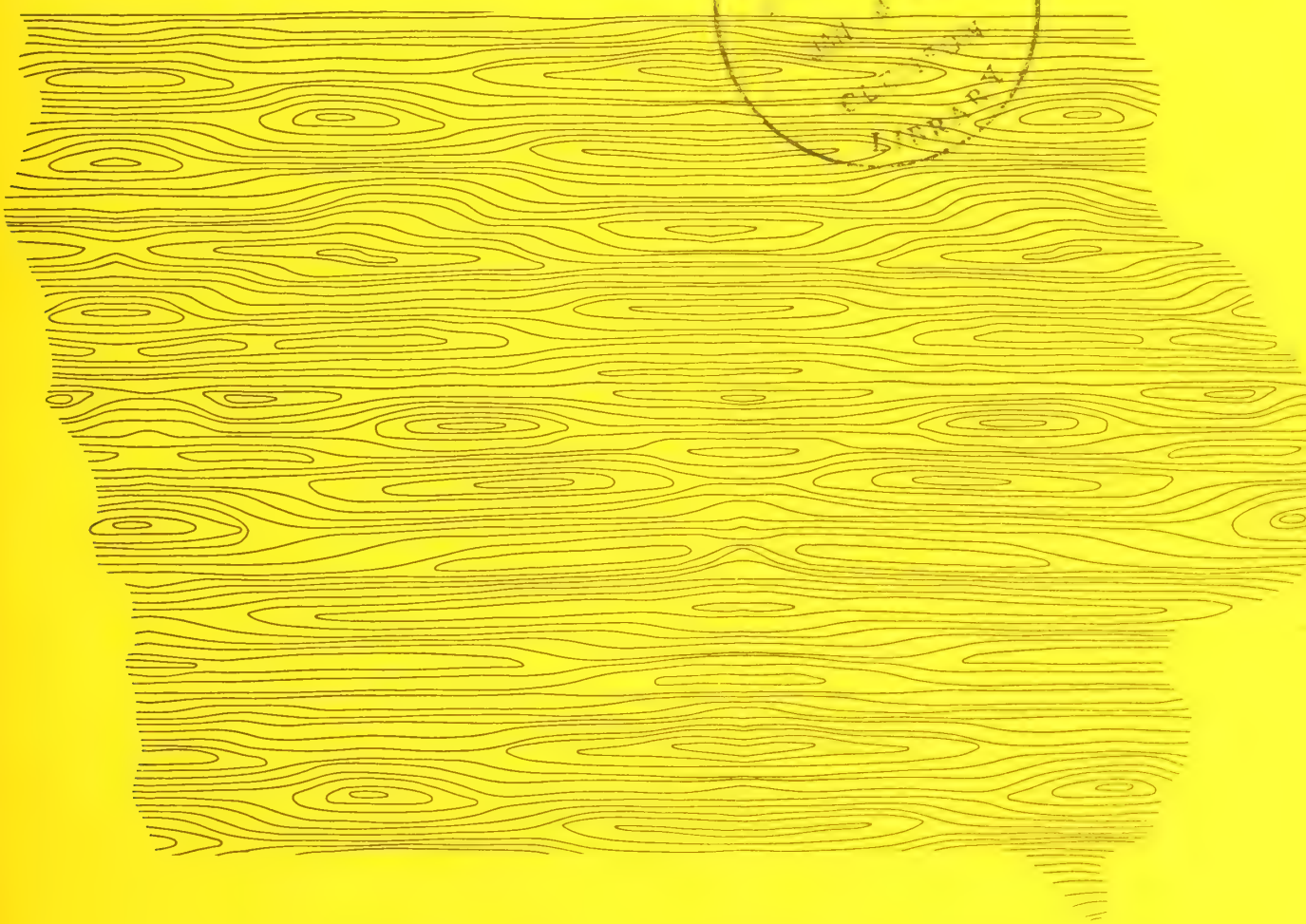
Bulletin **NC-82**

Primary Forest Products Industry and Timber Use, Iowa, 1980

James E. Blyth, John Tibben, and W. Brad Smith

GOVERNMENT ... 1985 ... DEPOSITORY



FOREWORD

This bulletin contains the results of a detailed study of forest industry, timber products output from roundwood, and associated primary mill wood and bark residue in Iowa in 1980. The last similar study was conducted in 1972. Detailed information such as this is necessary for intelligent planning and decision-making in wood procurement, forest resource management, and forest industry development. Similarly, researchers need current forest industry and timber products output information to plan projects.

We would like to give special thanks to the primary wood-using firms that supplied information for this study. We greatly appreciate their cooperation.

Quantities shown may vary slightly from one table to another because of rounding differences; however, these differences are insignificant.

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HIGHLIGHTS

- Since the early 1950's active (operating) sawmills have dropped from several hundred to 60 in 1972 and 41 in 1980.
- Industrial roundwood production rose 2 percent between 1972 and 1980 to 13.2 million cubic feet. Leading species cut were red oak, white oak, and cottonwood. Together they accounted for two-thirds of the industrial roundwood cut in 1980.
- The Northeastern Unit supplied 65 percent of all industrial roundwood.
- From a sustained yield basis, no species appear to have been overutilized, and all species, except walnut, appear to have been underutilized.
- Saw log production, 80 percent of industrial roundwood, was 63.5 million board feet—up 19 percent from 1972. Major harvest increases since 1972 were in white oak, red oak, and walnut.
- Elm losses to Dutch Elm disease during the 1970's caused elm saw log production to be nearly 5 million board feet lower in 1980 than in 1972.
- Saw log exports from Iowa to other States climbed from 2.9 million board feet in 1972 to 8.4 million board feet in 1980.
- Iowa sawmills depended less on other States for their log requirements in 1980 than in 1972. Total log receipts at Iowa sawmills were 63.0 million board feet in 1980.
- Coarse mill residue was in strong demand for manufacturing pulp and for household fuel.
- Great progress has been made since 1972 in finding markets for primary wood-using mill residue. However, additional markets for fine and bark residue are needed because more than one-half of the bark and more than one-fourth of the fine residue was not used in 1980.

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PRIMARY FOREST PRODUCTS INDUSTRY AND TIMBER USE, IOWA, 1980

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PRIMARY FOREST INDUSTRY—INDUSTRIAL ROUNDWOOD

Sawmills dominate the active (operating) primary wood-using mill population in Iowa. Out of the 45 known active mills in 1980, 41 were sawmills. All but 4 of the sawmills were in the two eastern Survey Units, which contain the major timber supply (fig. 1).

Active sawmills have dropped from several hundred in the early 1950's to 60 in 1972 and 41 in 1980. In addition, one veneer mill has closed since 1972. Average annual lumber output per sawmill increased from 0.994 million board feet in 1972 to 1.536 million board feet in 1980. The surviving and new sawmills are generally larger, better managed, and more financially sound than those in the 1950's.

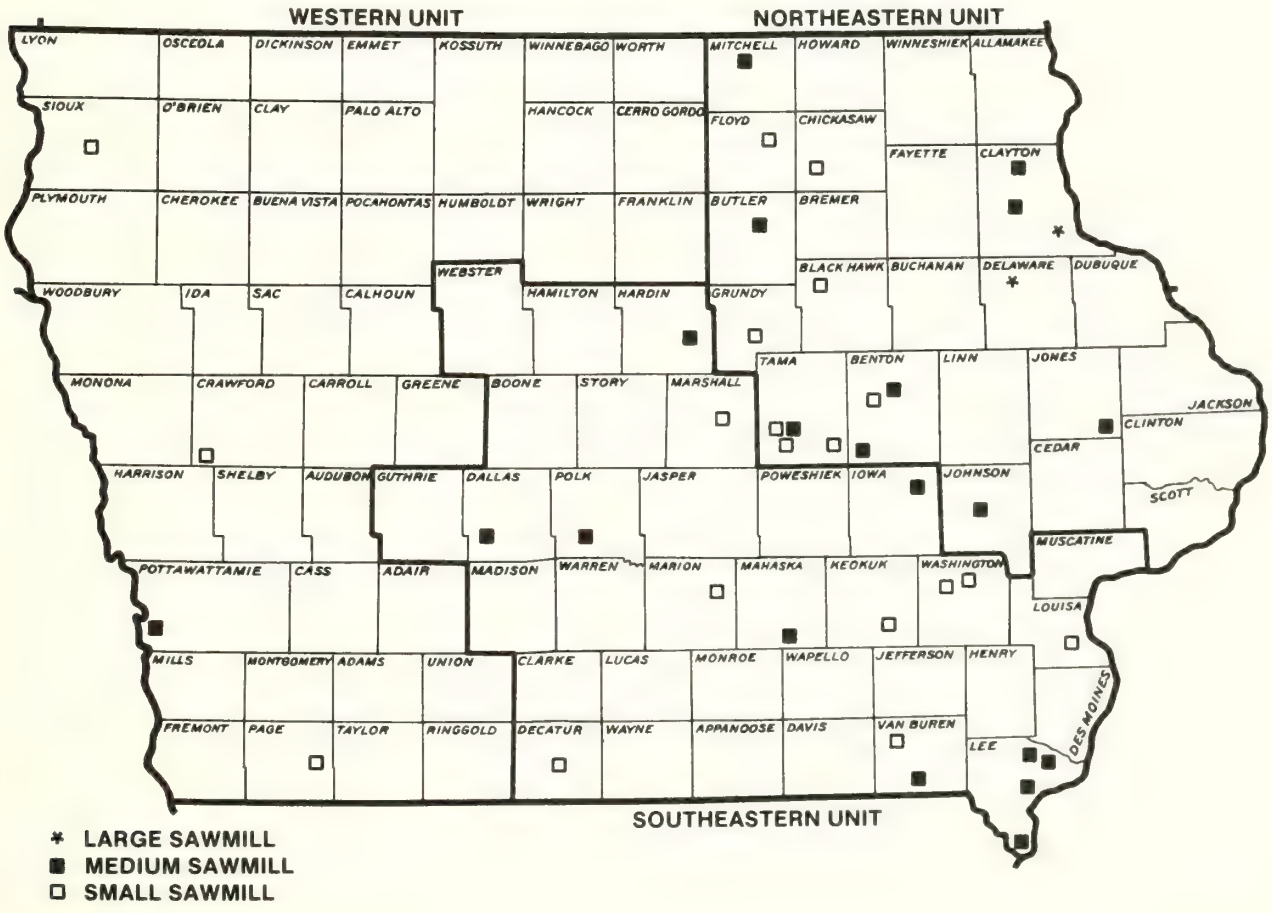

Figure 1.—*Active sawmills and Forest Survey Units in Iowa, 1980. Sawmills are classed by volume of lumber produced in 1980: large = 5 million or more board feet; medium = 1 to 4.999 million board feet; small = less than 1 million board feet. Forest Survey Units are the geographic areas used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nation's forest resources.*

Industrial roundwood production in 1980 was 2 percent higher than in 1972. A 21 percent increase in the Northeastern Unit offset declines in the Southeastern and Western Units:

Unit	Production 1972	1980	Change
	(Thousand cubic feet)		(Percent)
Northeastern	7,108	8,586	+21
Southeastern	4,668	3,903	-16
Western	1,160	726	-37
Total	12,936	13,215	+2

The Northeastern Unit increased its share of the industrial roundwood production from 55 percent in 1972 to 65 percent in 1980.

Principal species cut for industrial use were red oak (26 percent), white oak (25 percent), and cottonwood (16 percent). Other important species included walnut, soft maple, and hard maple.

TIMBER REMOVALS FOR INDUSTRIAL ROUNDWOOD

Estimated timber removals from growing stock on commercial forest land for industrial roundwood were 12.7 million cubic feet. Timber removals in each survey unit per thousand acres of commercial forest land[1] were:

Unit	Removals/thousand acres (Cubic feet)	(Cord equivalents)
Northeastern	14,190	180
Southeastern	5,625	71
Western	3,301	42
Average of all units	8,715	110

Cutting of growing stock (on a commercial forest area basis) was heaviest in the Northeastern Unit and lightest in the Western Unit. Harvesting of growing stock was light in all Units.

Timber removals for industrial roundwood in 1980 by species were compared with net annual growth determined during the previous Iowa forest inventory (1973). These comparisons roughly show which species may have been over or undercut in 1980 (in terms of sustained yield). No species was harvested at a rate greater than 75 percent of net annual growth:

Species	Removals (Percent of net annual growth)
Walnut	75
Red oak	64
Red pine	62
Hard maple	55
Cottonwood	52
White oak	45
Elm	38
Ash	19
Basswood	18
Soft maple	14
Hackberry	9
Aspen	6
Black cherry	5
Birch	3
Hickory	3
Willow	3

These indicators of possible over- or underutilization should be used cautiously because (1) wood procurement volumes fluctuate from year to year, (2) net annual growth used in the comparison was for 1973, (3) stand-age structure may mask the extent of under- or overutilization, and (4) apparent over- or undercutting may be a temporary timber management strategy to improve stand structure and species mix.

Allowing for these cautions, no species appear to have been overcut and all species, except walnut, seem to have been undercut in 1980.

SAW LOGS

Saw logs constituted 80 percent of all industrial roundwood harvested in 1980. Loggers cut 63.5 million board feet of saw logs in Iowa, up 19 percent from 1972. Principal species harvested were red oak, cottonwood, and white oak; together they comprised nearly two-thirds of the harvest.

Major harvest gains since 1972 were in white oak, red oak, and walnut. Elm output fell nearly 5 million board feet from 1972 to 1980 due to continuing losses from Dutch Elm disease.

During 1972, 2.9 million board feet of saw logs, mostly walnut, oak, and soft maple, were shipped to other States; Missouri, Minnesota, and Kansas were the primary recipients. In 1980, exports rose to 8.4 million board feet, 5.0 million board feet of which were shipped to Wisconsin. Primary exports continued to be oak and walnut.

Loggers cut two-thirds of the saw log volume in the Northeastern Unit as well as 98 percent of the elm, hard maple, and aspen. Twenty-six percent of the saw

[1] *Area of commercial forest land in 1974 at the time of the last forest inventory in Iowa.*

log volume was cut in the Southeastern Unit, including about one-half of the cottonwood and soft maple. The Western Unit provided only 7 percent of the saw log harvest but 44 percent of the walnut.

During 1980, Iowa sawmills received 63.0 million board feet of logs. Iowa was more self-sufficient in supplying logs to its sawmills in 1980 than in 1972. Iowa sawmills imported 15 percent (9.1 million board feet) of their log requirements in 1972 compared with 12 percent (7.9 million board feet) in 1980. Missouri was the chief source of imports in 1972; walnut was the principal import. Illinois, Missouri, and Minnesota each supplied more than 2.4 million board feet in 1980. Walnut was a minor import; cottonwood was the leading import. Southeast Unit mills were most dependent on imports, processing two-thirds of the logs received from other States.

OTHER PRODUCTS

Other industrial roundwood products harvested in 1980 included 3.8 million board feet of veneer logs[2], 3.4 million board feet of cooperage logs, and 16,800 cords of pulpwood. Compared to 1972 veneer log production was down 27 percent, pulpwood production from roundwood was off 46 percent, and cooperage log production was more than 5 times higher.

All of the cooperage logs cut were white oak, the only species acceptable for tight cooperage. Oak (red and white) was the chief pulpwood species and oak together with walnut were the primary veneer species.

PRIMARY MILL RESIDUE

During 1980, Iowa's primary wood-using mills (except pulpmills) generated 87,000 green tons of coarse residue, 53,000 green tons of fine residue, and 37,000 green tons of bark. Coarse residue is wood suitable for chipping such as slabs, edgings, and veneer cores. The Northeastern Unit generated the most residue: 62 percent of the coarse residue, 64 percent of the fine residue, and 63 percent of the bark.

Excellent progress has been made in finding uses for residue since 1972:

Kind of residue	Percent used	
	1969	1980
Coarse	45	90
Fine	15	70
Bark	6	48

Principal uses in 1980 for coarse residue were for pulp manufacturing (fiber products) and for domestic (household) fuelwood. Fine residue was used mainly for livestock bedding, poultry litter, mulch, and similar products. Major bark uses were for domestic fuelwood and miscellaneous products such as mulch.

Finding markets for residue is usually not a problem for larger mills. Unused residue is most likely to be found at smaller mills and some medium-sized mills where residue storage may not be a problem and the volume available may be insufficient to attract customers. Unused residue is often piled, used for landfill, or burned as waste.

OUTLOOK

When economic activity turns up, demand for Iowa industrial roundwood should grow, especially saw log demand. As the economy grows, demand generally increases for wood pallets, crating, railroad ties, replacement furniture, and home remodeling supplies. If interest rates decline during an economic upturn, new home construction rises along with additional furniture purchases for these new homes. Increased demand for these intermediate or end use products leads to greater demand for industrial roundwood to produce them.

Sawmills will continue to dominate Iowa's forest industry. Overall demand for Iowa saw logs should continue to rise during the next decade. Average sawmill size is likely to continue increasing. The number of active sawmills may be nearing a period of stability—mills dropping out of production usually should be replaced by others.

Additional market outlets should become available for fine residue and bark. If current trends continue, more than 90 percent of the fine residue and bark will be used by 1990.

[2]*Does not include log exports to other countries, except Canada.*

APPENDIX

STUDY METHODS

Data for this publication came from canvassing with a formal questionnaire all of the known primary wood-using mills that use Iowa logs and bolts. All canvassing in Iowa (except two pulpmills) was initially done by personal contact, telephone, and mail by the Iowa Conservation Commission (ICC). For a few Iowa mills that did not furnish complete data, ICC utilization and marketing specialists provided estimates based on prior knowledge and contacts. The North Central Forest Experiment Station (using formal questionnaires) contacted by mail two Iowa pulpmills and all out-of-State mills using Iowa roundwood; follow-up on nonrespondents was by mail and telephone. The Station edited and compiled the data.

Except for walnut cut for saw logs and veneer logs, logging utilization factors developed from a 1971-1972 study in Missouri were used to estimate growing stock and sawtimber removals for industrial roundwood in 1980. For walnut saw logs and veneer logs we used factors developed during a 1966 study in Indiana.

SAMPLING ERROR

Because all primary wood-using mills were canvassed, there is no sampling error for the roundwood products they use.

DEFINITION OF TERMS

Coarse mill residue.—Wood residue suitable for chipping such as slabs, edgings, and veneer cores.

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. Generally, this includes areas suitable for growing crops of industrial wood in excess of 20 cubic feet per acre annually.

Consumption.—The quantity of a commodity, such as pulpwood, utilized.

Fine mill residue.—Wood residue not suitable for chipping such as sawdust and veneer clippings.

Forest Survey Unit.—A geographic area (group of counties) used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nation's forest resources.

Growing-stock trees.—All live poletimber and sawtimber trees of commercial species except rough and rotten trees. Poletimber trees are from 5.0 to 8.9 inches d.b.h. for softwoods and from 5.0 to 10.9 inches d.b.h. for hardwoods. Softwood sawtimber trees are 9.0 inches d.b.h. or larger; hardwood sawtimber trees are 11.0 inches d.b.h. or larger.

Industrial roundwood production.—The quantity of industrial roundwood harvested in a geographic area.

Industrial roundwood products.—Saw logs, pulpwood, veneer logs, commercial posts, cooperage logs, handle bolts, shaving bolts, charcoal bolts, and chips from roundwood. Does not include fuelwood or noncommercial posts.

Industrial roundwood receipts.—The quantity of industrial roundwood received in a geographic area regardless of the geographic source.

Primary wood-using mills.—Mills using roundwood products (including chips from roundwood).

Primary wood-using mill residue.—Wood materials (coarse and fine) and bark not utilized for principal products at mills using roundwood. These residues include wood products (byproducts) obtained incidental to production of principal products and wood materials not utilized for some product.

Roundwood.—Logs, bolts, or other round sections cut from trees (including chips from roundwood).

Sawtimber removals for industrial roundwood.—The volume of sound bole wood (between a 1-foot stump and the point on the bole above which a saw log cannot be produced) in sawtimber growing-stock trees on commercial forest land removed annually for industrial roundwood products (including logging residues). The minimum saw log top is 7.0 inches diameter outside bark for softwoods and 9.0 inches diameter outside bark for hardwoods.

Standard cord.—A stack of wood bolts (or the equivalent) encompassing 128 cubic feet of wood, bark, and air space.

Timber removals for industrial roundwood.—The volume of sound bole wood (between a 1-foot stump and a minimum top diameter of 4.0 inches outside bark or to a point where the central stem breaks into limbs) in poletimber and sawtimber growing-stock trees on commercial forest land removed annually for industrial roundwood products (including logging residues).

COMMON AND SCIENTIFIC NAMES OF TREE SPECIES MENTIONED

SOFTWOODS

Eastern redcedar ..... *Juniperus virginiana*

Eastern white pine ..... *Pinus strobus*
Red pine ..... *Pinus resinosa*

HARDWOODS

Select white oaks
White oak ..... *Quercus alba*
Swamp white oak ..... *Quercus bicolor*
Bur oak ..... *Quercus macrocarpa*
Chinkapin oak ..... *Quercus muehlenbergii*
Other white oaks
Overcup oak ..... *Quercus lyrata*
Post oak ..... *Quercus stellata* var. *stellata*
Select red oaks
Northern red oak ..... *Quercus rubra*
Other red oaks
Northern pin oak ..... *Quercus ellipsoidalis*
Shingle oak ..... *Quercus imbricaria*
Pin oak ..... *Quercus palustris*
Black oak ..... *Quercus velutina*
Hickory
Bitternut hickory ..... *Carya cordiformis*
Shellbark hickory ..... *Carya laciniosa*
Shagbark hickory ..... *Carya ovata*
Mockernut hickory ..... *Carya tomentosa*
Hard maple
Black maple ..... *Acer nigrum*
Sugar maple ..... *Acer saccharum*
Soft maple
Silver maple ..... *Acer saccharinum*
Ashes
White ash ..... *Fraxinus americana*
Black ash ..... *Fraxinus nigra*
Green ash ..... *Fraxinus pennsylvanica*
Eastern cottonwood ..... *Populus deltoides*
Aspens
Bigtooth aspen ..... *Populus grandidentata*
Quaking aspen ..... *Populus tremuloides*
American basswood ..... *Tilia americana*
Elms
American elm ..... *Ulmus americana*
Slippery elm ..... *Ulmus rubra*
Rock elm ..... *Ulmus thomasii*
Black walnut ..... *Juglans nigra*
Black cherry ..... *Prunus serotina*
Hackberry ..... *Celtis occidentalis*
Black willow ..... *Salix nigra*
Birches
River birch ..... *Betula nigra*
Paper birch ..... *Betula papyrifera*
Other hardwoods
Boxelder ..... *Acer negundo*
Ohio buckeye ..... *Aesculus glabra*
Honeylocust ..... *Gleditsia triacanthos*
Kentucky coffeetree ..... *Gymnocladus dioicus*
Butternut ..... *Juglans cineria*
Osage-orange ..... *Maclura pomifera*
Red mulberry ..... *Morus rubra*
Sycamore ..... *Platanus occidentalis*
Black locust ..... *Robinia pseudoacacia*

TABLE TITLES

Table 1.—Industrial roundwood production by type of product and species group in Iowa, 1980

Table 2.—Number of active primary wood-using mills in Iowa, 1972 and 1980

Table 3.—Industrial roundwood production by species group and Survey Unit in Iowa, 1980 (In thousand cubic feet)

Table 4.—Timber removals from growing stock on commercial forest land for industrial roundwood by species group and Survey Unit in Iowa, 1980 (In thousand cubic feet)

Table 5.—Timber removals from sawtimber on commercial forest land for industrial roundwood by species group and Survey Unit in Iowa, 1980 (In thousand board feet)[1]

Table 6.—Saw log production by species group in Iowa, 1972 and 1980 (In thousand board feet)[1]

Table 7.—Saw log production by Survey Unit, species group, and State of destination, Iowa, 1980 (In thousand board feet)[1]

Table 8.—Saw log receipts in Iowa by Survey Unit, species group, and State of origin, 1980 (In thousand board feet)[1]

Table 9.—Pulpwood production in Iowa by species group, 1965, 1970, 1975, and 1980 (In standard cords, unpeeled)

Table 10.—Veneer log production in Iowa by species group, 1966, 1970, 1976, and 1980 (In thousand board feet)[1]

Table 11.—Veneer log production by species group and State of destination, Iowa, 1980 (In thousand board feet)[1]

Table 12.—Residue produced at primary wood-using mills by type of material, type of use, and county, Iowa, 1980 (In thousand tons, green weight)

Table 1.--Industrial roundwood production by type of product and species group, Iowa, 1980

Species group	All products	Product							
		Sawlogs		Veneer logs		Cooperage logs		Pulpwood	
	MCF[1]	MBF[2]	MCF[1]	MBF[2]	MCF[1]	MBF[2]	MCF[1]	Cords[3]	MCF[1]
Softwoods									
Red pine	4	--	--	--	--	--	--	61	4
Eastern redcedar	[4]	3	[4]	--	--	--	--	--	--
Total	4	3	[4]	--	--	--	--	61	4
Hardwoods									
Ash	339	1,636	279	57	13	--	--	586	47
Aspen	69	305	47	--	--	--	--	274	22
Basswood	440	2,185	347	84	19	--	--	936	74
Birch	36	152	26	--	--	--	--	127	10
Black cherry	36	132	21	--	--	--	--	194	15
Cottonwood	2,059	12,831	1,979	23	5	--	--	971	75
Elm	572	2,866	455	--	--	--	--	1,453	117
Hackberry	99	498	81	--	--	--	--	226	18
Hickory	77	447	77	--	--	--	--	--	--
Hard maple	621	3,367	575	14	4	--	--	547	42
Soft maple	950	5,089	809	24	5	--	--	1,720	136
Red oak	3,505	16,470	2,939	1,132	259	--	--	3,898	307
White oak	3,299	12,118	2,162	672	154	3,384	558	5,396	425
Walnut	1,022	5,025	769	1,795	253	--	--	--	--
Willow	69	233	37	--	--	--	--	395	32
Other hardwoods	18	118	18	--	--	--	--	--	--
Total	13,211	63,472	10,621	3,801	712	3,384	558	16,723	1,320
All species	13,215	63,475	10,621	3,801	712	3,384	558	16,784	1,324

[1] Thousand cubic feet.

[2] Thousand board feet, International 1/4-inch rule.

[3] Standard cords, unpeeled. A standard cord contains 128 cubic feet including wood, bark, and air space.

[4] Less than 500 cubic feet.

Table 2.--Number of active primary wood-using mills, Iowa, 1972 and 1980

Kind of mill	All Units 1972	All Units 1980	North-eastern Unit 1980	South-eastern Unit 1980	Western Unit 1980
Sawmills					
Large[1]	[2]	2	2	--	--
Medium[3]	48[4]	20	9	10	1
Small[5]	12	19	8	8	3
Subtotal	60	41	19	18	4
Veneer mills	2	1	1	--	--
Cooperage mills	1	1	1	--	--
Pulpmills	2	2	1	1	--
Total	65	45	22	19	4

[1] Annual lumber production of 5 million board feet or more.

[2] Included with medium sawmills.

[3] Annual lumber production of 1.000 to 4.999 million board feet.

[4] Includes large sawmills.

[5] Annual lumber production less than 1 million board feet.

Table 3.--Industrial roundwood production by species group and Forest Survey Unit, Iowa, 1980

(In thousand cubic feet)

Species group	All Units	North-eastern Unit	South-eastern Unit	Western Unit
Softwoods				
Red pine	4	4	--	--
Eastern redcedar	[1]	--	[1]	[1]
Total	4	4	[1]	[1]
Hardwoods				
Ash	339	240	89	10
Aspen	69	69	--	--
Basswood	440	379	51	10
Birch	36	20	16	--
Black cherry	36	30	6	--
Cottonwood	2,059	844	1,017	198
Elm	572	539	31	2
Hackberry	99	59	35	5
Hickory	77	39	38	--
Hard maple	621	602	19	--
Soft maple	950	431	504	15
Red oak	3,505	2,648	751	106
White oak	3,299	2,191	1,081	27
Walnut	1,022	442	227	353
Willow	69	42	27	--
Other hardwoods	18	7	11	--
Total	13,211	8,582	3,903	726
All species	13,215	8,586	3,903	726

[1] Less than 500 cubic feet.

Table 4.--Timber removals from growing stock on commercial forest land for industrial roundwood by species group and Forest Survey Unit, Iowa, 1980

(In thousand cubic feet)

Species group	All Units	North-eastern Unit	South-eastern Unit	Western Unit
Softwoods				
Red pine	5	5	--	--
Eastern redcedar	1/	--	1/	1/
Total	5	5	1/	1/
Hardwoods				
Ash	404	295	96	13
Aspen	61	61	--	--
Basswood	407	354	43	10
Birch	40	19	21	--
Black cherry	29	25	4	--
Cottonwood	2,336	958	1,151	227
Elm	519	493	24	2
Hackberry	89	54	31	4
Hickory	97	49	48	--
Hard maple	768	751	17	--
Soft maple	875	401	460	14
Red oak	3,068	2,348	627	93
White oak	2,996	2,028	945	23
Walnut	941	409	209	323
Willow	59	37	22	--
Other hardwoods	18	7	11	--
Total	12,707	8,289	3,709	709
All species	12,712	8,294	3,709	709

1/ Less than 500 cubic feet.

Table 5.--Timber removals from sawtimber on commercial forest land for industrial roundwood by species group and Forest Survey Unit Iowa, 1980

(In thousand board feet)[1/]

Species group	All Units	Northeastern Unit	Southeastern Unit	Western Unit
Softwoods				
Red pine	7	7	--	--
Eastern redcedar	3	--	2	1
Total	10	7	2	1
Hardwoods				
Ash	1,919	1,403	455	61
Aspen	336	333	3	--
Basswood	2,247	1,965	221	61
Birch	191	89	102	--
Black cherry	162	136	26	--
Cottonwood	13,693	5,619	6,737	1,337
Elm	2,888	2,766	112	10
Hackberry	496	314	155	27
Hickory	471	237	234	--
Hard maple	3,693	3,616	77	--
Soft maple	4,953	2,281	2,586	86
Red oak	11,857	9,035	2,467	355
White oak	12,422	8,370	3,958	94
Walnut	6,029	2,653	1,349	2,027
Willow	299	196	103	--
Other hardwoods	105	40	65	--
Total	61,761	39,053	18,650	4,058
All species	61,771	39,060	18,652	4,059

[1/] International 1/4-inch rule.

Table 6.--Saw log production by species group, Iowa, 1972 and 1980

(In thousand board feet)[1/]

Species	1972	1980	Change
Softwoods			
Red pine	2	--	-2
White pine	103	--	-103
Eastern redcedar	--	3	3
Total	105	3	-102
Hardwoods			
Ash	1,649	1,636	-13
Aspen	188	305	117
Basswood	2,205	2,185	-20
Birch	472	152	-320
Black cherry	113	132	19
Cottonwood	10,774	12,831	2,057
Elm	7,808	2,866	-4,942
Hackberry	568	498	-70
Hickory	783	447	-336
Hard maple	1,568	3,367	1,799
Soft maple	6,474	5,089	-1,385
Red oak	11,079	16,470	5,391
White oak	6,508	12,118	5,610
Walnut	2,669	5,025	2,356
Willow	438	233	-205
Other hardwoods	93	118	25
Total	53,389	63,472	10,083
All species	53,494	63,475	9,981

[1/] International 1/4-inch rule.

Table 7.--Saw log production by Survey Unit, species group, and state of destination, Iowa, 1980

(In thousand board feet)[1/]

Species group	All States	State				
		Iowa	Wisconsin	Minnesota	Indiana	Other States
ALL UNITS						
Eastern redcedar	3	3	--	--	--	--
Ash	1,636	1,617	19	--	--	--
Aspen	305	96	191	18	--	--
Basswood	2,185	2,000	167	18	--	--
Birch	152	152	--	--	--	--
Black cherry	132	132	--	--	--	--
Cottonwood	12,831	12,213	201	--	--	417
Elm	2,866	2,512	129	225	--	--
Hackberry	498	498	--	--	--	--
Hickory	447	427	20	--	--	--
Hard maple	3,367	3,158	182	27	--	--
Soft maple	5,089	5,078	11	--	--	--
Red oak	16,470	13,702	2,282	486	--	--
White oak	12,118	10,204	1,779	135	--	--
Walnut	5,025	2,977	31	18	752	1,247
Willow	233	233	--	--	--	--
Other hardwoods	118	118	--	--	--	--
All species	63,475	55,120	5,012	927	752	1,664
NORTHEASTERN UNIT						
Ash	1,232	1,213	19	--	--	--
Aspen	302	93	191	18	--	--
Basswood	1,944	1,759	167	18	--	--
Birch	56	56	--	--	--	--
Black cherry	114	114	--	--	--	--
Cottonwood	5,276	5,075	201	--	--	--
Elm	2,801	2,447	129	225	--	--
Hackberry	340	340	--	--	--	--
Hickory	225	205	20	--	--	--
Hard maple	3,336	3,127	182	27	--	--
Soft maple	2,383	2,372	11	--	--	--
Red oak	13,221	10,453	2,282	486	--	--
White oak	9,323	7,409	1,779	135	--	--
Walnut	1,797	1,323	31	18	425	--
Willow	171	171	--	--	--	--
Other hardwoods	45	45	--	--	--	--
All species	42,566	36,202	5,012	927	425	--

(Table 7 continued on next pag

[1/] International 1/4-inch rule.

(Table 7 continued)

Species group	All States	State				
		Iowa	Wisconsin	Minnesota	Indiana	Other States
SOUTHEASTERN UNIT						
Eastern redcedar	2	2	--	--	--	--
Ash	346	346	--	--	--	--
Aspen	3	3	--	--	--	--
Basswood	173	173	--	--	--	--
Birch	96	96	--	--	--	--
Black cherry	18	18	--	--	--	--
Cottonwood	6,301	6,301	--	--	--	--
Elm	53	53	--	--	--	--
Hackberry	128	128	--	--	--	--
Hickory	222	222	--	--	--	--
Hard maple	31	31	--	--	--	--
Soft maple	2,610	2,610	--	--	--	--
Red oak	2,654	2,654	--	--	--	--
White oak	2,642	2,642	--	--	--	--
Walnut	1,013	288	--	--	279	446
Willow	62	62	--	--	--	--
Other hardwoods	73	73	--	--	--	--
All species	16,427	15,702	--	--	279	446
WESTERN UNIT						
Eastern redcedar	1	1	--	--	--	--
Ash	58	58	--	--	--	--
Basswood	68	68	--	--	--	--
Cottonwood	1,254	837	--	--	--	417
Elm	12	12	--	--	--	--
Hackberry	30	30	--	--	--	--
Soft maple	96	96	--	--	--	--
Red oak	595	595	--	--	--	--
White oak	153	153	--	--	--	--
Walnut	2,215	1,366	--	--	48	801
All species	4,482	3,216	--	--	48	1,218

Table 8.--Saw log receipts by Survey Unit, species group, and state of origin, Iowa, 1980

(In thousand board feet)[1/]

Species group	All States	State				
		Iowa	Illinois	Missouri	Minnesota	Wisconsin
ALL UNITS						
Eastern redcedar	3	3	--	--	--	--
Ash	1,746	1,617	39	59	25	6
Aspen	96	96	--	--	--	--
Basswood	2,098	2,000	45	52	--	1
Birch	204	152	14	38	--	--
Black cherry	141	132	4	4	--	1
Cottonwood	15,501	12,213	652	399	2,236	1
Elm	2,584	2,512	14	33	25	--
Hackberry	535	498	8	29	--	--
Hickory	625	427	89	109	--	--
Hard maple	3,201	3,158	23	19	--	1
Soft maple	6,255	5,078	522	574	75	6
Red oak	14,857	13,702	523	540	75	17
White oak	11,607	10,204	670	666	50	17
Walnut	3,085	2,977	59	46	--	3
Willow	233	233	--	--	--	--
Other hardwoods	215	118	55	41	--	1
All species	62,986	55,120	2,717	2,609	2,486	54
NORTHEASTERN UNIT						
Ash	1,094	1,054	3	6	25	6
Aspen	93	93	--	--	--	--
Basswood	1,597	1,594	1	1	--	1
Black cherry	127	124	1	1	--	1
Cottonwood	7,250	5,011	1	1	2,236	1
Elm	2,449	2,424	--	--	25	--
Hackberry	165	165	--	--	--	--
Hickory	195	195	--	--	--	--
Hard maple	3,042	3,040	--	1	--	1
Soft maple	2,699	2,609	3	6	75	6
Red oak	10,261	10,142	10	17	75	17
White oak	7,713	7,619	10	17	50	17
Walnut	1,491	1,484	1	3	--	3
Willow	218	218	--	--	--	--
Other hardwoods	58	55	1	1	--	1
All species	38,452	35,827	31	54	2,486	54

(Table 8 continued on next page)

[1/] International 1/4-inch rule.

(Table 8 continued)

Species group	All States	State				
		Iowa	Illinois	Missouri	Minnesota	Wisconsin
SOUTHEASTERN UNIT						
Eastern redcedar	2	2	--	--	--	--
Ash	645	556	36	53	--	--
Aspen	3	3	--	--	--	--
Basswood	433	338	44	51	--	--
Birch	204	152	14	38	--	--
Black cherry	14	8	3	3	--	--
Cottonwood	7,621	6,572	651	398	--	--
Elm	123	76	14	33	--	--
Hackberry	366	329	8	29	--	--
Hickory	430	232	89	109	--	--
Hard maple	159	118	23	18	--	--
Soft maple	3,537	2,450	519	568	--	--
Red oak	4,078	3,042	513	523	--	--
White oak	3,818	2,509	660	649	--	--
Walnut	228	127	58	43	--	--
Willow	15	15	--	--	--	--
Other hardwoods	157	63	54	40	--	--
All species	21,833	16,592	2,686	2,555	--	--
WESTERN UNIT						
Eastern redcedar	1	1	--	--	--	--
Ash	7	7	--	--	--	--
Basswood	68	68	--	--	--	--
Cottonwood	630	630	--	--	--	--
Elm	12	12	--	--	--	--
Hackberry	4	4	--	--	--	--
Soft maple	19	19	--	--	--	--
Red oak	518	518	--	--	--	--
White oak	76	76	--	--	--	--
Walnut	1,366	1,366	--	--	--	--
All species	2,701	2,701	--	--	--	--

Table 9.--Pulpwood production in Iowa by species group, 1965, 1970, 1975, and 1980

(In standard cords, unpeeled)[1/]

Species group	1965	1970	1975	1980
Roundwood				
Softwoods	--	80	--	61
Soft hardwoods	12,596	16,321	15,809	6,169
Hard hardwoods	12,082	19,700	14,566	10,554
Total	24,678	36,101	30,375	16,784
Residue[2/]				
Softwood	--	10,227	4,666	4,986
Hardwood	6,401	11,353	15,457	22,539
Total	6,401	21,580	20,123	27,525
All material	31,079	57,681	50,498	44,309

[1/]A standard cord is a stack of logs and bolts (or the equivalent) encompassing 128 cubic feet including wood, bark, and air space.

[2/]Wood residue from wood-using mills such as chips from slabs and edgings generated at sawmills.

Table 10.--Veneer log production in Iowa by species group, 1966, 1970, 1976, and 1980

(In thousand board feet)[1/]

Species group	1966	1970	1976	1980
Ash	77	85	318	57
Basswood	587	301	301	84
Cottonwood	849	1,121	--	23
Elm	[2/]	483	32	--
Hard maple	245	292	123	14
Soft maple	320	97	264	24
Red oak	867	930	1,881	1,132
White oak	30	--	134	672
Walnut	3,138	785	1,841	1,795
Other hardwoods	797[3/]	500	349	--
All species	6,910	4,594	5,243	3,801

[1/]International 1/4-inch rule.

[2/]Included in other hardwoods.

[3/]Includes elm.

Table 11.--Veneer log production by species group and state of destination, Iowa, 1980

(In thousand board feet)[1/]

Species group	All States	State						
		Iowa	Indiana	Wisconsin	Illinois	Missouri	Ohio	Other states
Ash	57	--	--	57	--	--	--	--
Basswood	84	--	--	84	--	--	--	--
Cottonwood	23	--	--	--	--	--	--	23
Hard maple	14	--	11	3	--	--	--	--
Soft maple	24	--	--	24	--	--	--	--
Red oak	1,132	--	216	754	162	--	--	--
White oak	672	--	513	34	101	2	22	--
Walnut	1,795	979	563	--	41	174	38	--
All species	3,801	979	1,303	956	304	176	60	23

[1/] International 1/4-inch rule.

Table 12.--Residue produced at primary wood-using mills by type of material, type of use, and county, Iowa, 1980

(In thousand tons green weight)

NORTHEASTERN UNIT

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Benton								
Fiber products	--	3.23	--	3.23	--	--	--	--
Industrial fuel	--	.32	--	--	--	.32	--	--
Domestic fuel	--	2.93	--	2.93	--	--	--	1.25
Miscellaneous[4]	--	2.38	--	--	--	2.38	--	.07
Not used	--	1.32	--	.27	--	1.05	--	1.43
Total	--	10.18	--	6.43	--	3.75	--	2.75
Black Hawk								
Domestic fuel	--	1.11	--	1.11	--	--	--	.47
Miscellaneous[4]	--	.64	--	--	--	.64	--	--
Total	--	1.75	--	1.11	--	.64	--	.47
Butler								
Fiber products	--	3.70	--	3.70	--	--	--	--
Miscellaneous[4]	--	1.08	--	--	--	1.08	--	.63
Not used	--	1.08	--	--	--	1.08	--	.94
Total	--	5.86	--	3.70	--	2.16	--	1.57
Chickasaw								
Domestic fuel	--	.05	--	.05	--	--	--	.02
Miscellaneous[4]	--	.03	--	--	--	.03	--	--
Not used	--	.66	--	.42	--	.24	--	.18
Total	--	.74	--	.47	--	.27	--	.20
Clayton								
Fiber products	--	7.40	--	7.40	--	--	--	--
Domestic fuel	--	3.68	--	3.68	--	--	--	--
Miscellaneous[4]	--	7.29	--	--	--	7.29	--	.56
Not used	--	1.44	--	1.44	--	--	--	4.77
Total	--	19.81	--	12.52	--	7.29	--	5.33
Delaware								
Fiber products	--	11.10	--	11.10	--	--	--	--
Miscellaneous[4]	--	2.58	--	--	--	2.58	--	--
Not used	--	3.88	--	--	--	3.88	--	4.72
Total	--	17.56	--	11.10	--	6.46	--	4.72

(Table 12 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulpmills.

[4] Livestock bedding, poultry litter, mulch, etc.

(Table 12 continued)

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Floyd								
Domestic fuel	--	0.89	--	0.89	--	--	--	--
Miscellaneous[4]	--	.65	--	--	--	0.65	--	--
Not used	--	.22	--	.22	--	--	--	0.47
Total	--	1.76	--	1.11	--	.65	--	.47
Grundy								
Fiber products	--	1.82	--	1.82	--	--	--	--
Miscellaneous[4]	--	--	--	--	--	--	--	.71
Not used	--	1.84	--	--	--	1.84	--	.31
Total	--	3.66	--	1.82	--	1.84	--	1.02
Johnson								
Domestic fuel	--	2.56	--	2.56	--	--	--	1.09
Miscellaneous[4]	--	1.60	--	--	--	1.60	--	--
Not used	--	.35	--	.29	--	.06	--	.12
Total	--	4.51	--	2.85	--	1.66	--	1.21
Jones								
Fiber products	--	2.27	--	2.27	--	--	--	.63
Industrial fuel	--	1.85	--	1.85	--	--	--	.79
Domestic fuel	--	1.00	--	1.00	--	--	--	.16
Miscellaneous[4]	--	4.73	--	--	--	4.73	--	--
Not used	--	.16	--	.16	--	--	--	.97
Total	--	10.01	--	5.28	--	4.73	--	2.55
Mitchell								
Domestic fuel	--	3.70	--	3.70	--	--	--	--
Not used	--	2.15	--	--	--	2.15	--	1.57
Total	--	5.85	--	3.70	--	2.15	--	1.57
Tama								
Domestic fuel	--	3.74	--	3.74	--	--	--	1.60
Miscellaneous[4]	--	1.72	--	--	--	1.72	--	--
Not used	--	.55	--	.06	--	.49	--	.02
Total	--	6.01	--	3.80	--	2.21	--	1.62
All counties								
Fiber products	--	29.52	--	29.52	--	--	--	.63
Industrial fuel	--	2.17	--	1.85	--	.32	--	.79
Domestic fuel	--	19.66	--	19.66	--	--	--	4.59
Miscellaneous[4]	--	22.70	--	--	--	22.70	--	1.97
Not used	--	13.65	--	2.86	--	10.79	--	15.50
Total	--	87.70	--	53.89	--	33.81	--	23.48

(Table 12 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulpmills.

[4] Livestock bedding, poultry litter, mulch, etc.

(Table 12 continued)

SOUTHEASTERN UNIT

County and type of use	Wood residue							
	Total		Coarse[1/]		Fine[2/]		Bark[3/]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Dallas								
Miscellaneous[4/]	--	2.96	--	1.62	--	1.34	--	--
Not used	--	.69	--	.69	--	--	--	0.98
Total	--	3.65	--	2.31	--	1.34	--	.98
Decatur								
Domestic fuel	--	.02	--	.02	--	--	--	.01
Miscellaneous[4/]	--	.12	--	--	--	.12	--	--
Not used	--	.21	--	.20	--	.01	--	.09
Total	--	.35	--	.22	--	.13	--	.10
Hardin								
Fiber products	--	2.53	--	2.53	--	--	--	1.08
Miscellaneous[4/]	--	1.47	--	--	--	1.47	--	--
Total	--	4.00	--	2.53	--	1.47	--	1.08
Iowa								
Fiber products	--	2.22	--	2.22	--	--	--	--
Miscellaneous[4/]	--	1.29	--	--	--	1.29	--	.94
Total	--	3.51	--	2.22	--	1.29	--	.94
Keokuk								
Domestic fuel	--	.02	--	.02	--	--	--	.01
Miscellaneous[4/]	--	.02	--	--	--	.02	--	--
Not used	--	.15	--	.10	--	.05	--	.04
Total	--	.19	--	.12	--	.07	--	.05
Lee								
Fiber products	--	12.32	--	12.32	--	--	--	2.20
Miscellaneous[4/]	--	4.16	--	--	--	4.16	--	3.04
Not used	--	3.02	--	--	--	3.02	--	--
Total	--	19.50	--	12.32	--	7.18	--	5.24
Louisa								
Fiber products	--	.83	--	.83	--	--	--	--
Domestic fuel	--	.09	--	.09	--	--	--	--
Miscellaneous[4/]	--	.27	--	--	--	.27	--	.20
Not used	--	.27	--	--	--	.27	--	.20
Total	--	1.46	--	.92	--	.54	--	.40

(Table 12 continued on next page)

[1/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3/] Does not include bark at pulpmills.

[4/] Livestock bedding, poultry litter, mulch, etc.

(Table 12 continued)

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Mahaska								
Domestic fuel	--	0.87	--	0.87	--	--	--	--
Miscellaneous[4]	--	1.01	--	--	--	1.01	--	--
Not used	--	.87	--	.87	--	--	--	0.74
Total	--	2.75	--	1.74	--	1.01	--	.74
Marion								
Domestic fuel	--	.60	--	.60	--	--	--	.25
Miscellaneous[4]	--	.35	--	--	--	.35	--	--
Total	--	.95	--	.60	--	.35	--	.25
Marshall								
Domestic fuel	--	.05	--	.05	--	--	--	.02
Miscellaneous[4]	--	.03	--	--	--	.03	--	--
Total	--	.08	--	.05	--	.03	--	.02
Polk								
Domestic fuel	--	2.20	--	1.39	--	.81	--	.59
Not used	--	2.20	--	1.39	--	.81	--	.59
Total	--	4.40	--	2.78	--	1.62	--	1.18
Van Buren								
Domestic fuel	--	.47	--	.47	--	--	--	--
Miscellaneous[4]	--	.74	--	--	--	.74	--	--
Not used	--	2.40	--	1.81	--	.59	--	.97
Total	--	3.61	--	2.28	--	1.33	--	.97
Washington								
Domestic fuel	--	.98	--	.98	--	--	--	.42
Miscellaneous[4]	--	.56	--	--	--	.56	--	--
Not used	--	.30	--	.19	--	.11	--	.08
Total	--	1.84	--	1.17	--	.67	--	.50
All counties								
Fiber products	--	17.90	--	17.90	--	--	--	3.28
Domestic fuel	--	5.30	--	4.49	--	.81	--	1.30
Miscellaneous[4]	--	12.98	--	1.62	--	11.36	--	4.18
Not used	--	10.11	--	5.25	--	4.86	--	3.69
Total	--	46.29	--	29.26	--	17.03	--	12.45

(Table 12 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulpmills.

[4] Livestock bedding, poultry litter, mulch, etc.

(Table 12 continued)

County and type of use	Wood residue							
	Total		Coarse[1/]		Fine[2/]		Bark[3/]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
WESTERN UNIT								
Crawford								
Domestic fuel	--	0.33	--	0.33	--	--	--	--
Miscellaneous[4/]	--	.38	--	--	--	0.38	--	--
Not used	--	.33	--	.33	--	--	--	0.28
Total	--	1.04	--	.66	--	.38	--	.28
Page								
Domestic fuel	--	.04	--	.04	--	--	--	--
Miscellaneous[4/]	--	--	--	--	--	--	--	--
Not used	--	.07	--	.03	--	.04	--	.03
Total	--	.11	--	.07	--	.04	--	.03
Pottawattamie								
Industrial fuel	--	4.46	--	2.82	--	1.64	--	--
Domestic fuel	--	--	--	--	--	--	--	.24
Miscellaneous[4/]	--	--	--	--	--	--	--	.96
Total	--	4.46	--	2.82	--	1.64	--	1.20
Sioux								
Domestic fuel	--	.08	--	.08	--	--	--	--
Miscellaneous[4/]	--	.04	--	--	--	.04	--	--
Not used	--	--	--	--	--	--	--	.03
Total	--	.12	--	.08	--	.04	--	.03
All counties								
Industrial fuel	--	4.46	--	2.82	--	1.64	--	--
Domestic fuel	--	.45	--	.45	--	--	--	.24
Miscellaneous[4/]	--	.42	--	--	--	.42	--	.96
Not used	--	.40	--	.36	--	.04	--	.34
Total	--	5.73	--	3.63	--	2.10	--	1.54
ALL UNITS								
Total Iowa								
Fiber products	--	47.42	--	47.42	--	--	--	3.91
Industrial fuel	--	6.63	--	4.67	--	1.96	--	.79
Domestic fuel	--	25.41	--	24.60	--	.81	--	6.13
Miscellaneous[4/]	--	36.10	--	1.62	--	34.48	--	7.11
Not used	--	24.16	--	8.47	--	15.69	--	19.53
Total	--	139.72	--	86.78	--	52.94	--	37.47

[1/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3/] Does not include bark at pulpmills.

[4/] Livestock bedding, poultry litter, mulch, etc.

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Primary forest products industry and timber use, Iowa, 1980. Resour. Bull NC-82. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 21 p.

Discusses recent Iowa forest industry trends, timber removals for industrial roundwood in 1980, production and receipts of saw logs in 1980, and production of other industrial roundwood products in 1980. Reports on wood and bark residue generated at primary mills and the disposition of this residue.

KEY WORDS: Saw logs, sawmills, mill residue, timber removals.

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Resource
~~Research~~
Bulletin NC-83

Kansas Forest Inventory, 1981

John S. Spencer, Jr., John K. Strickler, and William J. Moyer

This report includes the most commonly used Forest Inventory and Analysis (FIA) statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information from the raw inventory data are expected to pay the retrieval costs. These costs will vary from less than $100 for a relatively simple request to $2,000 for a complete retrieval involving the services of a FIA computer programmer. Requests for data will be scheduled to minimize the impact on the work unit.

Requests for published, unpublished, or additional information may be directed to:

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Forest Inventory and Analysis Project
North Central Forest Experiment Station
1992 Folwell Avenue
St. Paul, Minnesota 55108

Phone: (612) 642-5275

Area served: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, Wisconsin.

In Kansas, requests for published, unpublished, or additional information may be directed to:

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FOREWORD

Forest Inventory and Analysis (formerly called Forest Survey) is a continuing endeavor as mandated by the Forest and Rangeland Renewable Resources Planning Act of 1974, which was preceded by the McSweeney-McNary Forest Research Act of 1928. Its objective is to inventory periodically the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. This kind of up-to-date information is essential for intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for Forest Inventory and Analysis work done in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, and Wisconsin.

Fieldwork for the 1981 Kansas Forest Survey was begun in October 1980 and was completed in July 1981. Reports on the two previous surveys of Kansas' timber resources are dated 1936 and 1965.

Because of intensified field sampling, more accurate survey information was obtained during the 1981 survey than otherwise would have been feasible. This was made possible through the close cooperation provided the North Central Station by State and Extension Forestry, Kansas State University. Special funding requested by the Governor and appropriated by the 1980 Kansas Legislature allowed State and Extension Forestry to provide additional personnel to intensify the field sample. State and Extension Forestry also canvassed primary wood-using plants in the State, and those results were used to help estimate the quantity of timber products harvested in Kansas.

Aerial photos used in the Kansas forest inventory were provided by the USDA Agricultural Stabilization and Conservation Service.

HIGHLIGHTS

Forest Area

- Forest land totaled 1.4 million acres in 1981, 2.6 percent of the State's land area.
- Commercial forest area increased from 1,192 to 1,208 thousand acres between 1965 and 1981.
- Nonindustrial private parties own 96 percent of the commercial forest--farmers alone own 62 percent.
- The oak-hickory forest type leads all others with 317 thousand acres or 26 percent of the commercial area.
- Sawtimber stands are the most extensive stand-size class with 565 thousand acres or 47 percent of the commercial area.
- Stands aged 1-20 years make up the largest proportion of commercial forest (29 percent).
- Average site index is 62 feet.
- One-half of all commercial forest land is on deep, well-drained soils commonly found on cove sites and intermittent stream bottoms.
- Fifty percent of the commercial forest is within one-fourth mile of a maintained road.
- Noncommercial forest land amounts to 151 thousand acres.
- Wooded strips amount to 150 thousand acres and windbreaks amount to 186 thousand acres.
- Wooded pasture accounted for 210 thousand acres in 1981 compared to 369 thousand acres in 1965.

Timber Volume

- Volume of growing stock increased 42 percent from 1965 to 1981, from 503 to 711 million cubic feet.
- Sawtimber volume on commercial forest land increased 31 percent from 1965 (2.0 billion board feet) to 1981 (2.6 billion board feet).
- Wooded strip land and short-log trees account for an additional 463 million board feet, making a total State volume of 3.0 billion board feet.
- Linn County contains the largest growing-stock volume, 31 million cubic feet.
- Rough, rotten, short-log, and salvable dead tree volume amounts to 216 million cubic feet.
- Cottonwood leads all species in growing-stock volume with 19 percent of the total.
- Nearly all species increased in volume between surveys, but elm growing stock decreased drastically due to Dutch elm disease--from 89 million cubic feet in 1965 to 31 million cubic feet in 1981.
- Elm sawtimber volume dropped even more significantly--from 358 million board feet in 1965 to 70 million board feet in 1981.
- Fifty-two percent of the growing-stock volume is in trees in the 14-inch diameter class and smaller.
- Average growing-stock volume per acre was 589 cubic feet in 1981, compared to 422 cubic feet in 1965.
- Forty-six percent of the growing-stock volume is in stands 51-80 years old.
- Black walnut growing-stock volume amounts to 58 million cubic feet, and walnut sawtimber volume is 170 million board feet.
- Volume in growing-stock trees on nonforest land (wooded strips, wooded pasture, and windbreaks) amounts to 115 million cubic feet.

Stand Conditions

- Net annual growth of growing stock increased from 22 to 23 million cubic feet between inventories.
- Growing-stock growth rate was 3.3 percent of inventory in 1980.
- Growing-stock net growth per acre increased from 18.5 cubic feet in 1964 to 19.2 cubic feet in 1980.
- Sawtimber growth on commercial forest land was 64 million board feet in 1980, 2.5 percent of inventory.
- Mortality of growing-stock trees increased from 3.3 million cubic feet in 1964 to 3.8 million cubic feet in 1980.
- Disease caused 40 percent of the 1980 mortality.

Timber Use

- Growing-stock removals increased from 8.3 to 14.0 million cubic feet between inventories.
- Sawtimber removals jumped from 30.0 to 53.3 million board feet between 1964 and 1980.
- Cottonwood accounted for the largest volume of 1980 growing-stock removals--1.9 million cubic feet.
- Timber removals of black walnut amounted to 1.3 million cubic feet in 1980, third highest among species.
- Eighty-six percent of the 1980 growing-stock removals were harvested for roundwood products, primarily fuelwood and saw logs.
- Output of fuelwood from roundwood nearly quadrupled from 1964 to 1980--from 68 to 255 thousand cords.
- Private land supplied virtually all of the removals from growing stock.
- Growing-stock removals amounted to only 60 percent of growth in 1980.

Biomass

- Total biomass of all live trees at least 1 inch in d.b.h. averages 44 green tons per acre.
- Greatest live tree biomass density is in the cottonwood type with 77 green tons per acre.

- Shrub biomass is greatest in the willow and eastern redcedar-hardwood forest types where it averages 2,786 and 2,767 pounds per acre green weight, respectively.
- Among the tall shrubs, roughleaf dogwood produces the greatest average biomass with 269 pounds per acre.
- Buckbrush predominates among low shrubs with an average of 129 pounds per acre.

Projections

- The low removals option projection shows inventory increasing from 711 to 1,098 million cubic feet between 1981 and 2011, a 54-percent gain. Growth is projected to remain higher than removals throughout the period but to approach removals during the last decade.
- The high removals option projection shows inventory rising from 711 to 974 million cubic feet in 2008, then declining to 969 million cubic feet in 2011. Removals are projected to surpass growth by 2008.
- The trend of increased fuelwood production is expected to continue. If the best young growing-stock trees are taken for fuelwood, future potential to produce quality saw logs will be greatly reduced. However, proper utilization of lower quality trees for fuelwood provides an opportunity for improved forest management.

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KANSAS FOREST INVENTORY, 1981

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Forest land in Kansas, more plentiful in the east and reduced to narrow stringers along rivers and streams in the west, totaled 1.4 million acres in 1981. This is a slight increase of 8,900 acres over the 1965 forest area (Chase and Strickler 1968). Although only 2.6 percent of Kansas' total land area, forests return important economic and non-commodity benefits to the State. Forest land includes commercial forest, unproductive forest, and productive-reserved forest land (see Definition of Terms in Appendix).

Probably the greatest single impact on the State's forest land between the 1965 and 1981 forest inventories was the death of many elms from Dutch elm disease--particularly the larger diameter trees. In 1965, elm was second only to cottonwood as the most predominant species in the State; but by 1981, it had become relatively insignificant compared to a number of other species.

AREA

Commercial Forest Gains 1.4 Percent Between Inventories

Commercial forest area increased slightly from 1,192 to 1,208 thousand acres between 1965[1] and 1981. One-third of the 1981 commercial area is pastured. This grazing on land for which the primary use is wood production is an obstacle to the establishment and regeneration of high-quality stands.

The largest area of commercial forest is in the Northeastern Survey Unit (588 thousand acres), followed by the Southeastern Unit (437 thousand), and the Western Unit (183 thousand) (fig. 1).

[1]*Figures have been adjusted from those published after the 1965 survey to conform to 1981 statistics because of changes in survey definitions and procedures.*

Linn County (48,700 acres) and Chautauqua County (48,500 acres), both in the Southeastern Unit, and Miami County (46,300 acres) in the Northeastern Unit, lead all other counties in commercial forest area. But in terms of commercial forest as a percent of total land area, Leavenworth County in the Northeastern Unit leads all others with 14.6 percent. Linn County (12.7 percent), Miami County (12.3 percent), and Jefferson County (12.0 percent) follow.

Most Forest is Privately Owned

Nonindustrial private parties own 96 percent of the commercial forest (fig. 2). Farmers alone own 62 percent of the State's commercial area, and miscellaneous private parties own another 34 percent.

Fifty-eight percent of the nonindustrial private forest land is owned by parties with 10 to 50 acres of commercial forest. Another 25 percent is owned by parties with from 50 to 500 acres, and 2 percent is owned by parties with 500 to 2,500 acres, as shown in the following tabulation. These areas represent the total area owned by an individual, and may include one or more non-continguous tracts.

Size of holding (Acres)	Area owned by nonindustrial private parties (Thousand acres)
1-5	31.0
5-10	132.8
10-20	272.3
20-50	401.3
50-100	194.6
100-100	95.0
500-2,500	21.9
2,500-5,000	--
5,000+	8.6
Total	1,157.5

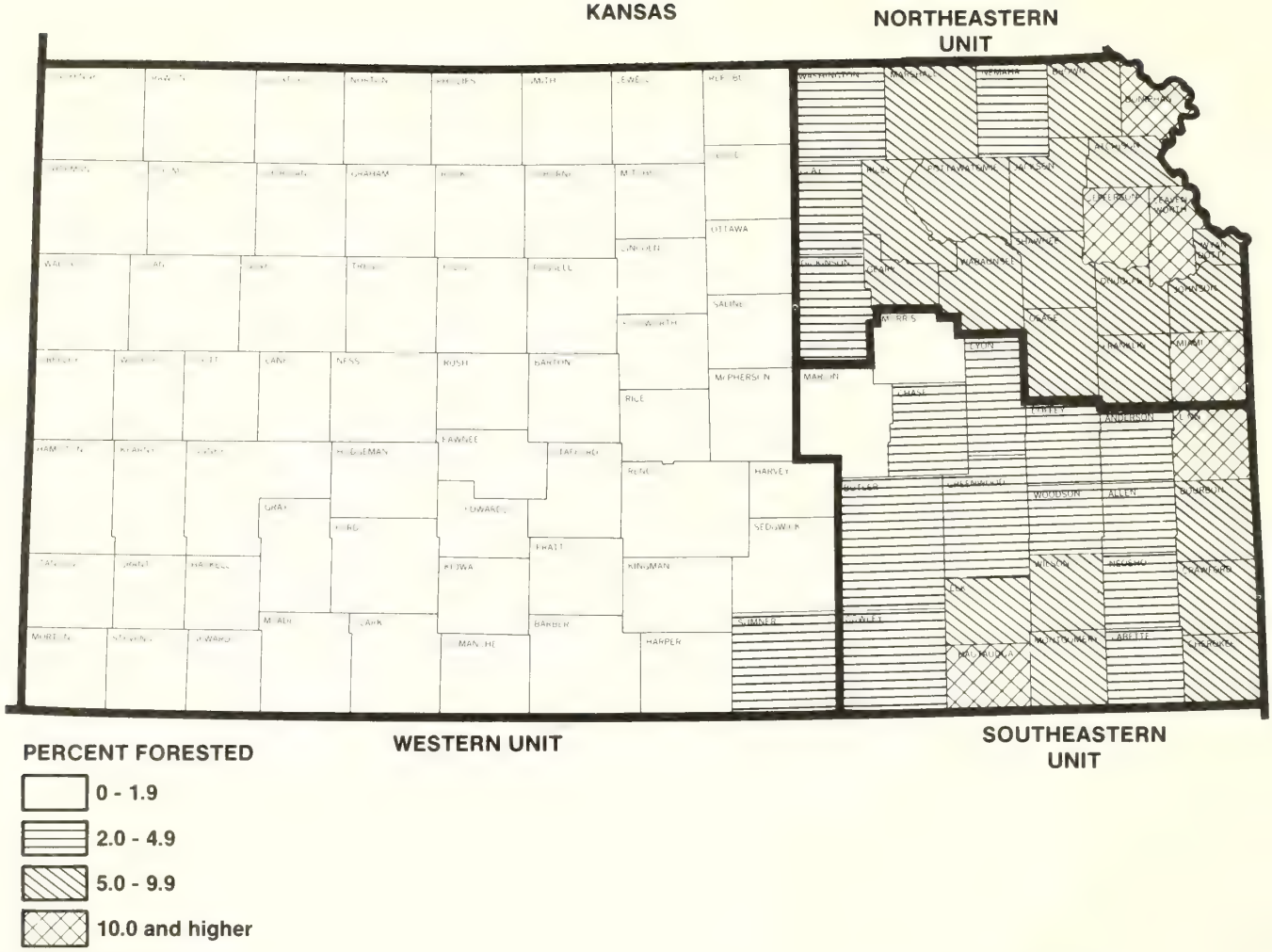

Figure 1.--*Survey units in Kansas and commercial forest area as a percent of all land, by county, 1981.*

Oak-Hickory Type Makes Up One-quarter of Commercial Area

The oak-hickory forest type, generally found on dry upland sites in the east, leads all others in area with 317 thousand acres (26 percent of the commercial area). This is a 71-percent increase from the 185 thousand acres in 1965. The elm-ash-cottonwood type, usually found on moist sites along stream bottoms, follows with 290 thousand acres, up 50 percent from the 193 thousand acres in 1965 (fig. 3). The lowland plains hardwood type, a mix of black walnut, hackberry, bur oak, soft maple, and boxelder generally found in coves and bottomlands, is the third largest forest type. It encompasses 266 thousand acres, a 20-percent gain over the 221 thousand acres in 1965. These three forest types together account for nearly three-fourths of the State's commercial forest area.

The upland elm-ash-locust type was the most extensive in 1965 with 229 thousand acres. But by 1981 it had declined 52 percent to 110 thousand acres, making it the fourth largest type. The high mortality rate of elm from Dutch elm disease between the two surveys undoubtedly accounts for some of the shift from the elm-ash-locust type to some of the other more predominant types in 1981. Other types that lost area between surveys include upland plains hardwoods that declined 56 percent and willow that declined 52 percent. Nonstocked area fell from 147 thousand acres in 1965 to 45 thousand acres in 1981, a 69-percent drop. It can be assumed that increased stocking levels in many cases shifted these nonstocked acres into other types in the later survey.

Sawtimber Stands Predominate

Sawtimber stands in Kansas account for the largest area of any stand-size class--565 thousand acres or 47 percent of the total commercial area. This is slightly higher than the national average for proportion of sawtimber stands (45 percent), but much less than the 57

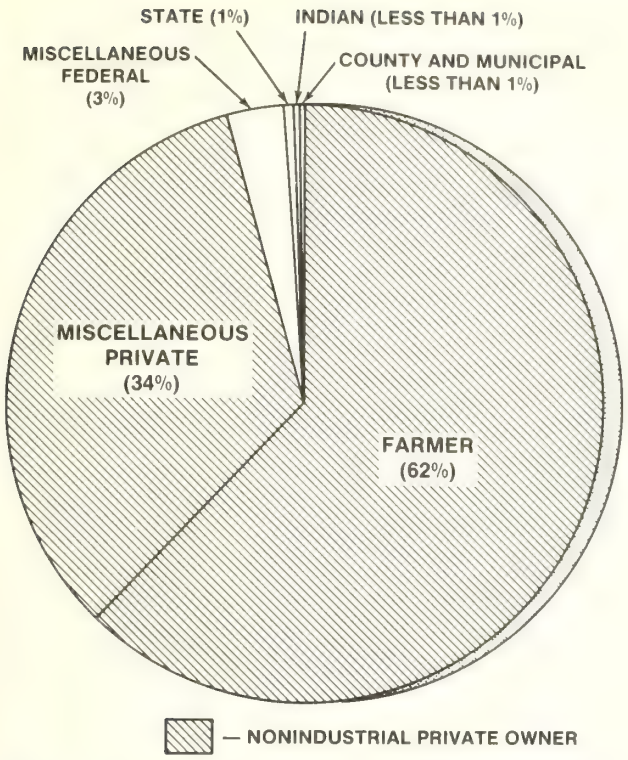

Figure 2.--*Area of commercial forest land by ownership class, Kansas, 1981.*

Figure 3.--*Elm-ash-cottonwood forest type paralleling a dry stream bed. This type is usually found on first or second bottoms of streams.*

percent estimated during the 1965 Kansas inventory. This drop in sawtimber acreage can be partially explained by the death of elm sawtimber trees. Sawtimber stand acreage in the upland elm-ash-locust type dropped from 106,100 acres in 1965 to 16,800 acres in 1981.

Sapling and seedling stands, with 363 thousand acres in 1981, are the second largest stand-size class. This class represents 30 percent of the commercial forest in 1981, compared to 12 percent in 1965. Nationwide, the average proportion of sapling and seedling stands is 24 percent of the commercial forest.

Poletimber stands account for 234 thousand acres in 1981 or 19 percent of the commercial area, the same proportion as in 1965. Throughout the U.S., poletimber stands average 28 percent of the total commercial area.

Nonstocked areas amounted to 45 thousand acres in 1981 (4 percent of the total), a big drop from the 147 thousand acres in 1965 (12 percent).

Largest areas of sawtimber stands are in the lowland plains hardwoods type (171 thousand acres), the elm-ash-cottonwood type (145 thousand acres), and the oak-hickory type (142 thousand acres). But the highest proportion of any forest type in sawtimber stands is the 88 percent of the cottonwood type. The eastern redcedar-hardwood type, which increased in area from 2.7 to 27.5 thousand acres between surveys, contains 80 percent of its area in sapling and seedling stands--highest of any type.

Largest Area in Stands Aged 1-20 Years

The distribution of commercial forest by stand-age class shows more area aged 1-20 years and less area aged 21-50 years (fig. 4). Stands 11-20 years old are most numerous with 193 thousand acres or 16 percent of the commercial forest area, and stands aged 1-10 years follow with 155 thousand acres or 13 percent of the total. Together, these two classes generally represent the new stands established since the last survey.

An ideal distribution of age classes from a forest management perspective is an equal area in each 10-year class through the rotation age[2] of the particular forest type and no area in classes beyond rotation age. The diminished area of stands 21-50 years old means a future shortage of mature timber in some forest types when they reach rotation age--primarily the elm-ash-cottonwood and lowland plains hardwoods types.

[2]*Rotation age is the period of years required to establish and grow timber crops to a specified condition of maturity.*

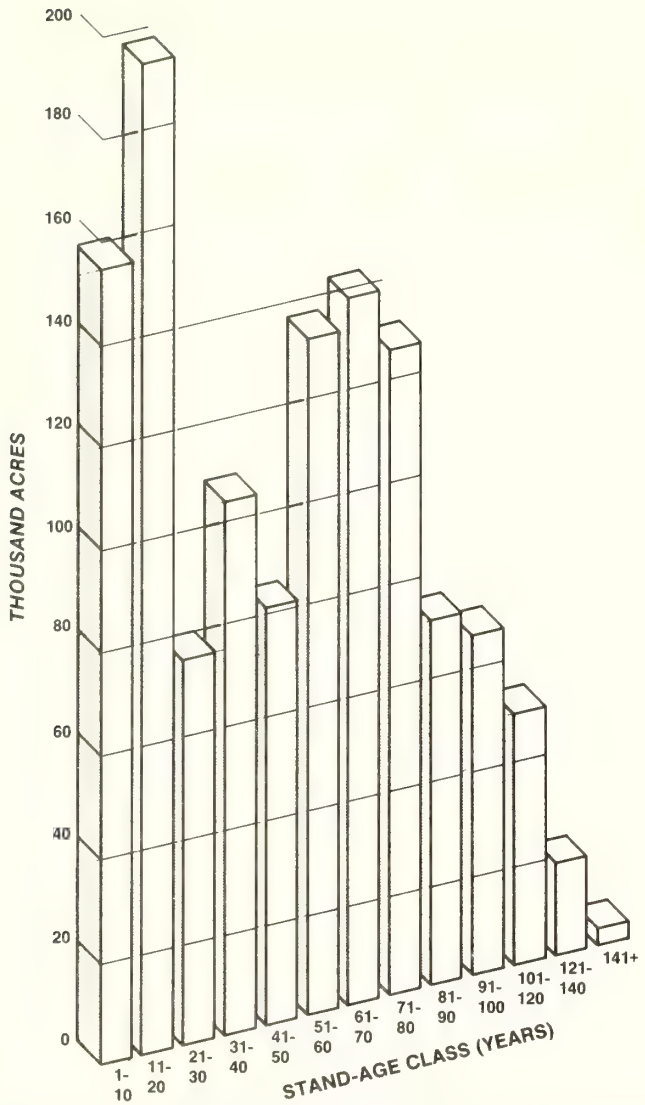

Figure 4.--*Area of commercial forest land by stand-age class, Kansas, 1981.*

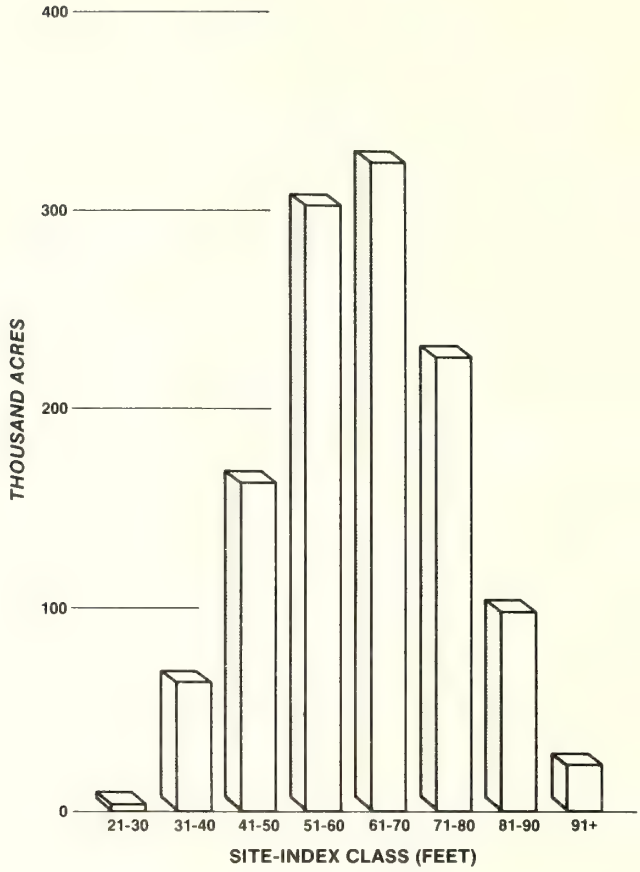

Figure 5.--*Area of commercial forest land by site-index class, Kansas, 1981.*

However, this imbalance in age classes is not strongly reflected in the diameter distribution of growing-stock trees of several desirable species such as ash, black walnut, and hackberry. Comparisons of the growing-stock diameter distribution for number of trees or cubic foot volume would indicate an opportunity to offset much of the effects of this age imbalance through improved forest management to favor these desirable species.

Average Site Class Highest of Plains States

Site class is one means of estimating forest site quality. Site class describes forest land in terms of its inherent capacity to grow wood based on fully stocked natural stands. Site class values are the cubic feet of growth per acre per year expected from such stands.

The weighted average site class for Kansas is 56.8 cubic feet of growth per acre per year, compared to a weighted average for the Plains States[3] of 54.1. (Commercial forest land can produce more than 20 cubic feet per acre of annual growth under management.)

Average Site Index is 62 Feet

Another way of estimating forest site quality is through use of site index information. Site index is a means of classifying forest land in terms of height growth of dominant or codominant trees of representative species within a forest type at 50 years of age. Eighty-one percent of the commercial forest area (979 thousand acres) grows trees taller than 51 feet at age 50, and 29 percent of the total grows trees taller than 71 feet (fig. 5).

[3]*In this paper the Plains States are considered to be North Dakota, eastern South Dakota (east of the 103rd meridian), Nebraska, and Kansas.*

Site index values differ by forest type. A high value for one type may be a low value for another type. The weighted average site index for all types is 62.2 feet. The highest weighted average is 67.5 feet for the lowland plains hardwoods type, followed by elm-ash-cottonwood (66.9 feet), upland plains hardwoods (64.3 feet), cottonwood (64.1 feet), and willow (64.0 feet). The lowest weighted average is the 45.2 feet in the eastern redcedar-hardwood type.

Half of Area on Deep, Well-drained Soils

Yet another way forest site quality can be appraised is by considering the area in each physiographic class. Physiographic class is a measure of soil and water conditions on a site that affect tree growth. The five classes range from exceptionally wet sites (hydric) to very dry sites (xeric). Best growing conditions for most species are in the class midway between these two extremes (mesic). Mesic sites are the deep, well-drained soils commonly found on cove sites and bottomlands along intermittent streams. One-half of the commercial forest area is on mesic sites, including 79 percent of the lowland plains hardwoods type, 70 percent of the elm-ash-cottonwood type, and 42 percent of the oak-hickory type (table 1).

Stocking Could be Improved

The stocking picture varies greatly depending upon whether only growing-stock trees or all live trees are considered. When all live trees, including rough and rotten trees and noncommercial species are considered, the area of commercial forest land at least medium stocked (61 percent stocked or better) is 1,035,000 acres or 86 percent of the total. This represents little change from 1965 when 1,014,000 acres (85 percent) were medium or better stocked with all live trees.

When only growing-stock trees are considered, the stocking situation has improved decidedly. Commercial forest acreage medium or better stocked with growing-stock trees increased from 161,500 acres (14 percent) in 1965 to 639,200 acres (53 percent) in 1981. Of this total, 95,000 acres are well stocked with growing-stock trees. The remainder of the commercial forest is either poorly stocked with growing-stock trees (523,300 acres) or nonstocked (45,400 acres).

Still, the 47 percent of commercial forest land poorly stocked or nonstocked with growing-stock trees represents a less than desirable situation. This land could produce trees much more efficiently if better stocked. Stocking is poorest in sapling and seedling stands where 57 percent of the area is poorly stocked with growing-stock trees. A larger proportion of the upland elm-ash-locust forest type is poorly stocked (66 percent) than any other type, although the eastern redcedar-hardwood (58 percent) and upland plains hardwoods types (58 percent) follow closely.

Half of Forest Within One-quarter Mile of Road

Fifty percent of the commercial forest area in Kansas is within one-fourth mile of a maintained road (one

Table 1.--*Area of commercial forest land by forest type and physiographic class, Kansas, 1981*

(In thousand acres)

Forest type	All classes	Physiographic class				
		Hydric	Hydro-mesic	Mesic	Xero-mesic	Xeric
Eastern redcedar-hardwood	27.5	--	--	2.4	25.1	--
Oak-hickory	316.6	2.6	7.6	132.7	155.5	18.2
Post-blackjack oak	30.9	--	1.2	9.8	17.6	2.3
Upland plains hardwoods	49.4	--	--	1.2	46.5	1.7
Elm-ash-cottonwood	289.6	9.0	77.1	203.5	--	--
Cottonwood	68.1	3.9	20.2	29.9	6.9	7.2
Willow	4.2	--	3.4	--	0.8	--
Lowland plains hardwoods	265.9	2.5	52.3	211.1	--	--
Upland elm-ash-locust	110.3	--	--	--	100.5	9.8
Nonstocked	45.4	9.1	3.0	11.5	19.7	2.1
All types	1,207.9	27.1	164.8	602.1	372.6	41.3

graded at least once a year), and 96 percent of it is within 1 mile of a road:

Distance to road (Miles)	Area of commercial forest land (Thousand acres)	Percent
0-⅛	240.2	20
⅛-¼	363.8	30
¼-1	560.2	46
1-2½	19.3	2
2½-5	16.1	1
5-10	--	--
10-20	8.3	1
20+	--	--
Total	1,207.9	100

One-fifth of Forest Within Quarter Mile of Open Water

Proximity of timber to open water may affect its suitability for harvest because of multiple use (primarily wildlife and recreation, and accessibility considerations. Twenty-one percent of the State's commercial forest area is within one-fourth mile of a lake or pond at least 5 acres in area or a stream at least 66 feet wide. Fourteen percent is within one-eighth mile of open water:

Distance to open water (Miles)	Area of commercial forest land (Thousand acres)	Percent
0-⅛	169.4	14
⅛-¼	81.0	7
¼-1	201.2	17
1-2½	211.6	17
2½-5	167.6	14
5-10	106.6	9
10-20	111.5	9
20+	159.0	13
Total	1,207.9	100

Noncommercial Forest Land Amounts to 150,800 Acres

Kansas also has two kinds of forest land on which industrial wood is not harvested: unproductive forest (128,400 acres) and productive-reserved forest land (22,400 acres).

All of the unproductive forest is owned by farmers and miscellaneous private parties, and most is in the post-blackjack oak type (59 percent), the eastern redcedar-hardwood type (13 percent), and the oak-hickory type (10 percent).

The productive-reserved forest land, which includes Christmas tree plantations, is primarily owned by public agencies. The oak-hickory type (44 percent) and the eastern redcedar-hardwood type (33 percent) account for most of the productive-reserved area.

Wooded Strips and Windbreaks--An Important Resource

The area of nonforest land with trees (1,189 thousand acres) almost equals the area of commercial forest land in the State. Trees are usually very sparse on this category of land except on wooded strips and windbreaks.

Wooded strips amount to 150,000 acres in Kansas (fig. 6). Most of these strips are in the elm-ash-cottonwood type (51,600 acres) and the lowland plains hardwoods type (49,900 acres), and almost all are owned by private parties. Only 10 percent of the area is in sawtimber stands, and almost equal amounts are in poletimber (39 percent) and sapling and seedling stands (38 percent). Sixty-one percent of the wooded strip area supports stands aged 30 years or less and 73 percent supports stands 40 years old and younger. The significance of wooded strips is indicated by the 92 million cubic feet of growing-stock trees and the 315 million board feet of sawtimber and short-log trees they contain. Although small tract size sometimes imposes constraints on logging, these wooded strips are frequently logged in conjunction with adjacent commercial land.

Windbreaks total 186,300 acres in the State (fig. 7). Because their primary purpose is protection from wind, these windbreaks are of little significance for timber supply except for occasional firewood cuttings. Windbreaks are more numerous in the Western Unit (76,400 acres), compared with the Southeastern Unit (66,900 acres) and the Northeastern Unit (43,000 acres). Both wooded strips and windbreaks are important habitat for wildlife.

One other significant class of nonforest land with trees is wooded pasture--grazed land with more than 16.7 percent stocking in live trees, but less than 25 percent stocking in growing-stock trees. In 1981, wooded pasture accounted for 210,000 acres--a 43-percent drop from 369,000 acres in 1965. Some of the wooded pasture acreage in 1965 may have shifted into the commercial forest acreage because of the increased growth and stocking of growing-stock trees. For example, this might account for the increase in acreage of the eastern redcedar-hardwood type from 2.7 to 27.5 thousand acres between surveys.

Figure 6.--*Wooded strips, like these following a meandering stream, are land that meets all the requirements for commercial forest land except that it supports trees in stands less than 120 feet wide.*

VOLUME

Timber Volume Shows Substantial Gain Between Inventories

Volume of growing stock on commercial forest land in Kansas increased 42 percent between 1965 (503 million cubic feet) and 1981 (711 million cubic feet). The continuing surplus of growth over timber removals between inventories causes these building inventory volumes.

The minor softwood growing-stock volume, which is entirely eastern redcedar, had surged to 21 times its 1965 volume by 1981. Hardwood volume, which accounts for 99 percent of the growing-stock total, gained 41 percent between inventories:

Species group	Growing-stock volume	
	1965	1981
	(Thousand cubic feet)	
Softwoods	216	4,591
Hardwoods	502,384	706,724
Total	502,600	711,315

Sawtimber volume on commercial forest land increased 31 percent, from 2.0 billion board feet[1] in 1965 to 2.6 billion in 1981. Softwood sawtimber volume showed an extraordinary expansion similar to the softwood growing-stock volume, but hardwoods showed a more modest gain:

[1] *International ¼-inch rule.*

Figure 7.--*Windbreaks, like the one above, are trees planted in strips less than 120 feet wide, used for protecting soil, fields, and buildings.*

Species group	Sawtimber volume	
	1965	1981
	(Million board feet)	
Softwoods	0.5	10.9
Hardwoods	1,953.0	2,555.3
Total	1,953.5	2,566.2

The Northeastern Survey Unit contains the largest growing-stock volume in the State. However, the Western Unit, which has the smallest volume of the three Survey Units, showed the greatest percent of increase between inventories (table 2).

Table 2.--*Net volume of growing stock and sawtimber in 1965 and 1981 by Forest Survey Unit and change since 1965, Kansas*

Forest Survey Unit	Growing-stock volume		Change since 1965	Sawtimber volume		Change since 1965
	1965	1981		1965	1981	
	Thousand cubic feet		*Percent*	*Thousand board feet*[1]		*Percent*
Northeastern	233,033	315,093	+ 35	879,200	1,107,613	+ 26
Southeastern	188,375	249,128	+ 32	738,579	828,546	+ 12
Western	81,192	147,094	+ 81	335,767	630,070	+ 88
Total	502,600	711,315	+ 42	1,953,546	2,566,229	+ 31

[1]International ¼-inch rule.

Linn County, with 31 million cubic feet, contains the largest growing-stock volume among counties, followed by Leavenworth (28 million cubic feet), Miami (26 million), Chautauqua (24 million), Bourbon (23 million), and Pottawatomie (22 million) (fig. 8).

Nongrowing-stock Volume is 216 Million Cubic Feet

In addition to the volume in growing-stock trees discussed thus far, rough and rotten, short-log, and salvable dead tree volume adds another 216 million cubic feet. Total volume on commercial forest land in Kansas, then, is 927 million cubic feet (table 3).

The volume in short-log trees is 148 million board feet, which brings total sawtimber volume on commercial forest land to 2,714 million board feet in the State. The volume in sawtimber trees and short-log trees on wooded strips adds another 315 million board feet, bringing the total volume to 3,029 million board feet.

Table 3.--*Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Kansas, 1981*

(In million cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Growing stock			
Sawtimber	490.8	1.9	488.9
Poletimber	220.5	2.7	217.8
Total growing stock	711.3	4.6	706.7
Rough and rotten cull	143.8	0.5	143.3
Short-log cull	67.4	0.4	67.0
Salvable dead	4.5	0.1	4.4
All classes	927.0	5.6	921.4

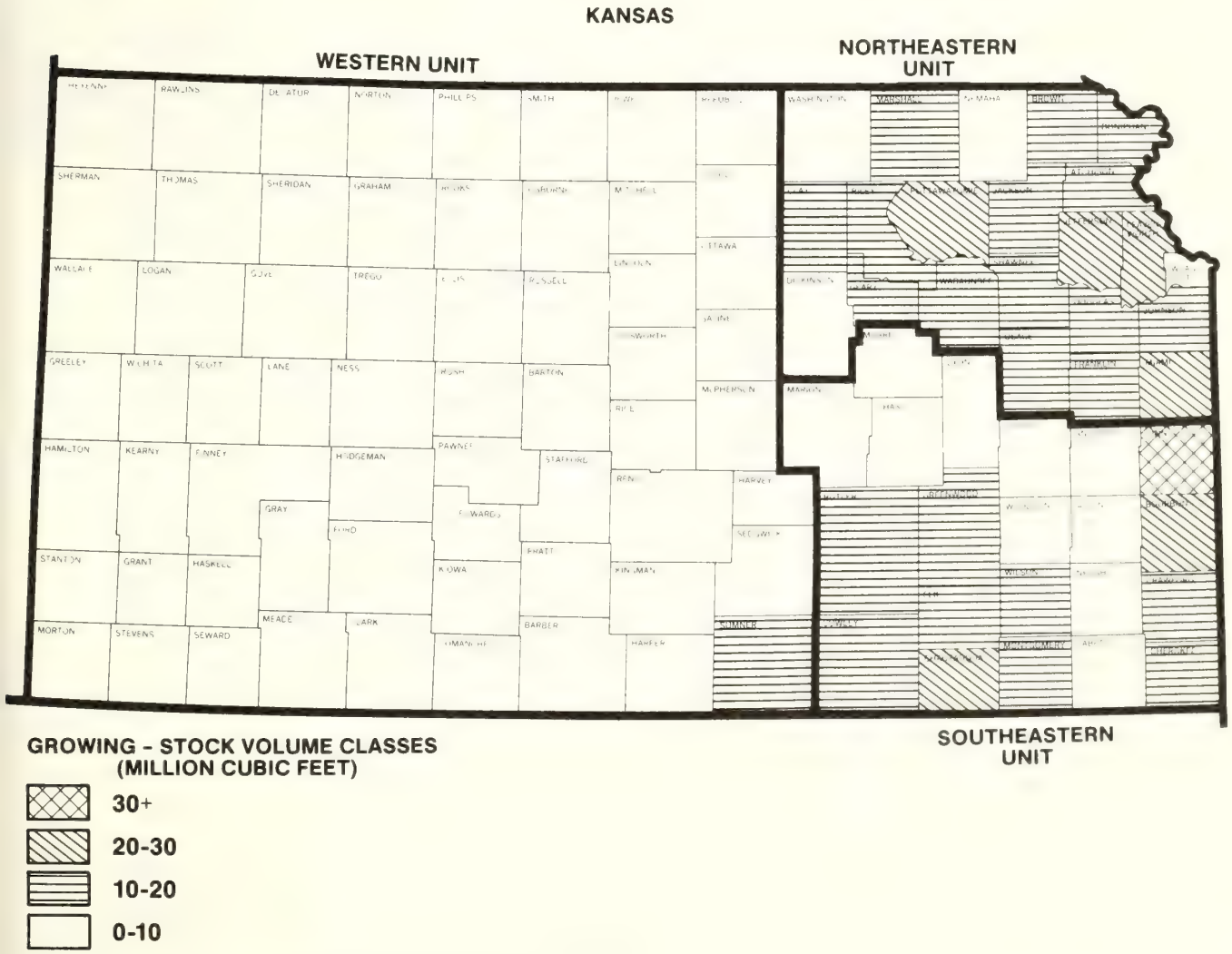

Figure 8.--*Growing-stock volume in Kansas counties, 1981.*

Although cull and salvable dead trees take up space that could be used by potentially more valuable growing-stock trees, some of them provide homes for cavity-nesting birds and other wildlife. And many of these trees can be used for timber products such as saw logs or bolts and fuelwood.

Cottonwood First in Growing-stock Volume with One-fifth of Total

In both 1965 and 1981, cottonwood led all other species in growing-stock and sawtimber volumes. The 134 million cubic feet of cottonwood represents 19 percent of the total growing-stock volume on commercial forest land in 1981 and is a 33-percent increase over the 1965 cottonwood growing-stock volume. In 1965, elm was second only to cottonwood in both growing-stock and sawtimber volumes, with a large concentration of volumes in the larger, overmature trees most susceptible to Dutch elm disease. The decimation of elm by the disease between the two surveys--elm growing-stock volume decreased from 89 to 31 million cubic feet--caused a reordering of volume rankings except for cottonwood. Hackberry moved up to second in 1981 with 87 million cubic feet, a 77-percent gain over its 1965 volume of 49 million cubic feet when it ranked third behind cottonwood and elm. Ash (62 million cubic feet), bur oak (61 million), and black walnut (58 million) are other species with large volumes. Black walnut, highly valued and in great demand for furniture, cabinets, gun stocks and other high-quality products, increased 57 percent from its 1965 volume of 37 million cubic feet. Sycamore was the only other species besides elm to decline in volume between surveys--a much more modest decline from 25 to 22 million cubic feet. Select white oaks (see Principal Tree and Shrub Species Groups in Kansas in Appendix) made the largest proportional increase between inventories, almost tripling from 12 to 34 million cubic feet.

The order of species by sawtimber volume is somewhat different from that of growing stock. Cottonwood dominates with 24 percent of the total, expanding from 459 million board feet in 1965 to 610 million board feet in 1981. Hackberry contains the second largest sawtimber volume, with 300 million board feet. Bur oak ranks third in sawtimber volume with 286 million board feet, ash is fourth with 186 million board feet, and select red oaks are fifth with 183 million board feet. Black walnut volume follows with 170 million board feet. As might be expected from its 1965 concentration of volume in the larger diameters, elm sawtimber volume plunged even more sharply than growing-stock volume--from 358 to 70 million board feet between inventories.

Nonindustrial private owners account for 94 percent of the growing-stock volume. Farmers clearly dominate with 60 percent of the total, and miscellaneous private parties own 34 percent of the volume. Public agencies own the remaining 6 percent.

Half of Growing-stock Volume in Trees 14 Inches in Diameter and Smaller

Fifty-two percent of the State's 1981 volume of growing stock is in trees in the 14-inch diameter class and smaller (fig. 9). There are no gaps in total growing-stock volume between succeeding diameter classes that might cause future supply problems, although uneven volumes by diameter class may pose problems in the future supply of certain species--especially soft maple, basswood and sycamore. Nineteen percent of the volume is in trees 24 inches in diameter and greater, due largely to the high proportions of cottonwood and bur oak volumes in these bigger trees. Forty-four percent of the total cottonwood volume and 38 percent of the bur oak volume are in these larger trees. Sixty-four percent of the cumulative growing-stock volume of ash, hackberry, and black walnut--among the 5 species with the greatest volumes--is in diameter classes 14 inches and smaller. The proportion in these classes is 76 percent for black walnut.

The 1981 growing-stock volumes are greater than the 1965 volumes in each diameter class, as shown in figure 9.

Average volume per acre of growing stock on commercial forest land in 1981 was 589 cubic feet compared to 422 cubic feet in 1965. Average volume per acre was highest in the cottonwood forest type (1,397 cubic feet), followed by the lowland plains hardwoods type (672), oak-hickory type (612), elm-ash-cottonwood type (596), and the post-blackjack oak type (555).

The average sawtimber volume per acre in 1981 was 2,125 board feet compared to 1,640 board feet in 1965. The cottonwood type leads by an even wider margin than for growing stock, averaging 6,024 board feet per acre, followed by lowland plains hardwood (2,564 board feet), elm-ash-cottonwood (2,162), and oak-hickory (2,114).

Three-quarters of the total growing-stock volume is in three forest types--oak-hickory (27 percent), lowland plains hardwoods (25 percent), and elm-ash-cottonwood (24 percent).

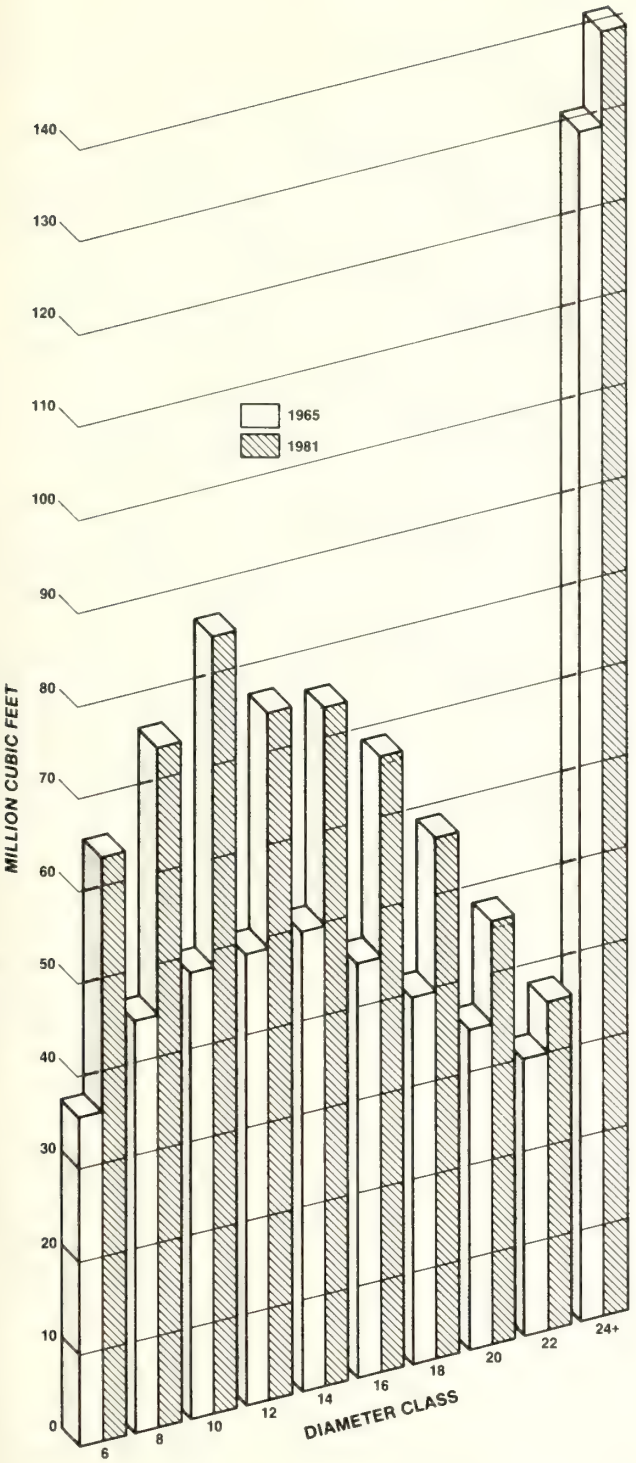

Figure 9.--*Net volume of growing stock on commercial forest land, by diameter class, Kansas, 1965 and 1981.*

Largest Volume in Stands Aged 51-80 Years

Forty-six percent of the total growing-stock volume is concentrated in stands 51-80 years old (fig. 10). This

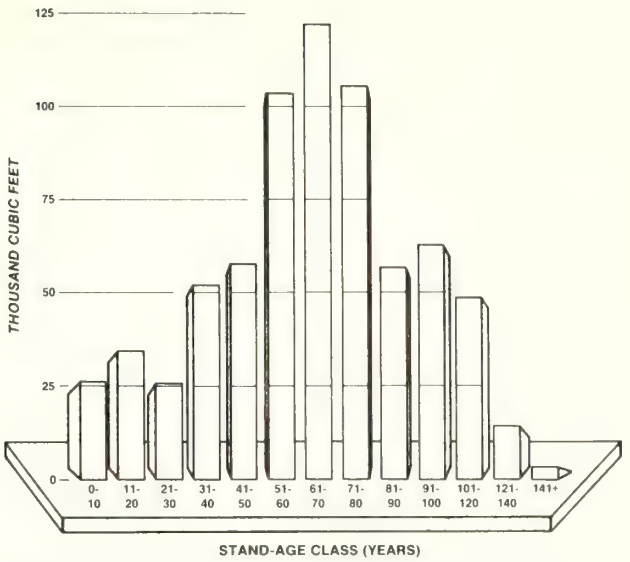

Figure 10.--*Net volume of growing stock on commercial forest land by stand-age class, Kansas, 1981.*

bulge corresponds to a similar bulge in the area of commercial forest land for those stand-age classes. These stands, which originated between 1901 and 1930, were among the first to become established as the public became more aware of its forests.

Sawtimber Quality is Good

The butt log of every sawtimber tree tallied in the Kansas inventory was log-graded. The total volume in sawtimber trees was grouped by butt log grade based on the sampled tree volumes by butt log grade. These volumes could not be converted to whole-tree log grades because the means to make this conversion accurately are not available. Volumes, then, represent the total volume in trees with the indicated butt log grade. However, experience in other States where butt log grade was converted to whole tree log grade indicates that the volume distribution by whole tree log grades is not much different from that of volumes in trees by butt log grade.

The volume of sawtimber is fairly evenly divided among the best three of the four log grades used to estimate saw log quality in Kansas (fig. 11). (See Log Grade section in Appendix for an explanation of individual log grades). Sycamore produces the highest proportion of sawtimber volume in grades 1 and 2 (log grade 1 is the highest quality) with 86 percent. Cottonwood ranks second in quality with 76 percent of its volume in these two grades, followed by ash (70 percent), willow (66 percent), black walnut (63 percent), and other hickories (63 percent).

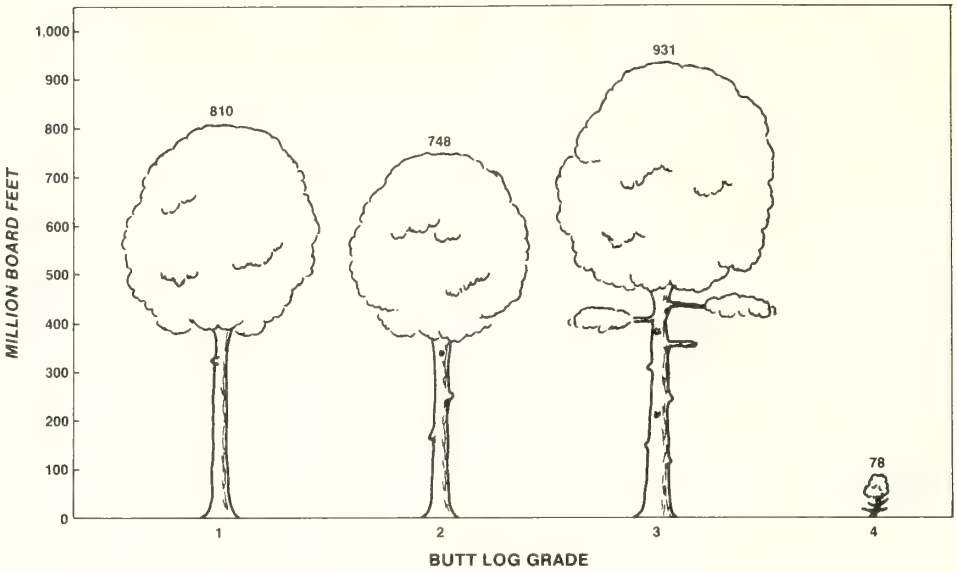

Figure 11.--*Net volume of sawtimber on commercial forest land by butt log grade, Kansas, 1981.*

Black Walnut Volume Increasing

Black walnut deserves special comment because of its exceptionally high value and the extraordinary demand for this fine hardwood. In addition to the 58 million cubic feet of black walnut growing stock in Kansas, there are 5 million cubic feet of short-log cull and 5 million cubic feet of rough and rotten cull black walnut on commercial forest land. Similarly there are 5 million cubic feet of walnut in all tree classes on wooded strips and another 3 million cubic feet of walnut on other nonforest land with trees (table 4).

Table 4.--*Net volume of black walnut by land class and tree class, Kansas, 1981*

(In million cubic feet)

Tree class	Commercial forest	Nonforest with trees	
		Wooded strips	Other
Growing stock	57.8	3.3	2.1
Short-log cull	5.5	0.7	0.6
Rough and rotten cull	5.4	0.5	0.8
All classes	68.7	4.5	3.5

Black walnut sawtimber volume on commercial forest land was 170 million board feet in 1981. The total walnut volume, including that from all tree classes and land classes, is 200 million board feet (see table 64 in Appendix).

The volume of black walnut increased between surveys faster than the hardwood volume average. Walnut growing stock increased 57 percent compared to an increase of 41 percent for all hardwood growing stock, and walnut sawtimber volume gained 57 percent compared to 31 percent for all hardwoods. However, volume of walnut in the larger diameter classes represents a smaller share of total walnut volume than it did in 1965, reflecting the heavy demand for large trees. In 1965, 15 percent of the walnut sawtimber volume was in trees 19 inches in diameter and larger, compared to 54 percent for all species. In 1981, only 12 percent of the walnut sawtimber volume was in trees at least 19 inches d.b.h., compared to 44 percent for all species.

Nonforest Land has Large Volume

In addition to the 711 million cubic feet of growing stock on commercial forest land discussed so far, nonforest land with trees contributes 115 million cubic feet in growing-stock trees, as seen below:

Land use	Volume of growing stock (Million cubic feet)
Wooded strips	91.5
Wooded pasture	23.4
Windbreaks	0.5
Total	115.4

Of this nonforest land, wooded strips have the greatest potential for commercial timber production because they meet the definition of commercial forest land in every way except they are less than 120 feet wide. In addition to growing-stock volume shown

above, wooded strips contain 300 million board feet in sawtimber trees.

Volume on wooded strips is fairly evenly divided between upland and lowland forest types. Cottonwood is the most abundant species on wooded strips (24 million cubic feet), followed by hackberry (13 million), bur oak (11 million), and ash (11 million). Forty-four percent of the growing-stock volume on wooded strips is in the Western Survey Unit, followed by the Northeastern Unit (33 percent), and the Southeastern Unit (23 percent).

In contrast to wooded strips, wooded pasture is primarily used for grazing; and a combination of this use, adverse sites, and poor tree quality preclude this land class from much commercial timber production. Wooded pastures are frequently rangeland or pastures invaded by low-quality trees. Some of these lands classed as wooded pasture may become commercial forest in the future as increased stocking and tree growth bring them into the required stocking to meet commercial forest standards. On the other hand, many others may be cleared of trees through proper range or pasture management.

GROWTH, MORTALITY, REMOVALS, AND BIOMASS

Net Growth Rises Slightly

Net annual growth of growing stock on commercial forest land increased 5 percent between surveys, from 22 million cubic feet in 1964 to 23 million cubic feet in 1980.

The Northeastern Unit accounted for 41 percent of the growth volume, but 44 percent of total growing-stock volume. The Southeastern Unit, however, claimed 42 percent of the growth even though it had 35 percent of growing-stock volume. And the Western Unit, with its somewhat harsher growing conditions and somewhat larger diameter trees, contributed only 17 percent of the growth volume, although it accounted for 21 percent of the growing-stock inventory.

The average cubic foot growth rate in the State in 1980 was 3.3 percent of growing-stock inventory, compared to 4.4 percent in 1964. This means that even though the volume of net growth increased between surveys (5 percent), it did not increase as fast as the growing-stock inventory (42 percent).

Net growth per acre increased from 18.5 cubic feet in 1964 to 19.2 cubic feet in 1980, a 4-percent gain.

The highest average cubic foot growth rate was in the Southeastern Unit (3.9 percent), followed by the Northeastern Unit (3.1 percent), and the Western Unit (2.6 percent).

Among species with the highest cubic foot growth rates are eastern redcedar (10.3 percent), boxelder (7.3 percent), hackberry (5.1 percent), and soft maple (4.5 percent).

Net annual growth of sawtimber in 1980 amounted to 64 million board feet--a growth rate of 2.5 percent of inventory. Sawtimber growth per acre averaged 53.0 board feet.

Net annual growth represents growth and ingrowth less natural mortality. The total volume lost by the death of a large, overmature tree cancels out the growth in many smaller diameter trees of the same species. Therefore, a species with a higher proportion of its trees and volume in the larger diameter classes, those likeliest to die, tends to have a lower net annual growth rate. Cottonwood, for example, has a net annual growing-stock growth rate of 1.9 percent, and a sawtimber growth rate of 1.4 percent--both rates well below average. Approximately half of the cottonwood cubic foot volume is in trees 21 inches in diameter and larger, compared to 19 percent for all other species combined.

Potential Growth Higher than Current Growth

The present net annual growth in Kansas is less than the potential net growth (or productive potential) of the commercial forest land, which cannot be measured accurately. However, we made a rough estimate of it by using site class information collected during the latest inventory. Site class values indicate the annual volume of growth per acre in fully stocked stands undisturbed by man (unmanaged or uncut) at culmination of mean annual increment[5].

By multiplying the area of commercial forest land in each site by the midpoint of the growth range in that class, we estimated potential growth in the State (table 5). This method yields inflated results because most stands in Kansas are neither fully stocked nor undisturbed. In addition, it does not take into account the present distribution of age classes or the obvious differences in growth among them. Spurr and Vaux (1976) discounted an estimate of potential growth for the Nation by 10 percent to arrive at a figure they considered realistic. A study of the aspen type in Wisconsin suggests that potential growth is 52 percent higher than current growth (Lundgren and Hahn 1978).

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[5]*Culmination of mean annual increment is the point at which a curve plotting current annual increment crosses a curve plotting mean annual increment.*

Table 5.--*Estimation of potential net annual growth on commercial forest land, Kansas, 1980*

Site class - cubic feet/acre/ year	Area of commercial forest land	Potential net growth/acre[1]	Total potential net growth
	Thousand acres	*Cu ft/acre/year*	*Thousand cubic feet/year*
120+	2.1	142.0	298.2
85-119	158.9	102.0	16,207.8
50-84	485.5	67.0	32,528.5
20-49	561.4	34.5	19,368.3
Total	1,207.9	--	68,402.8

[1]Midpoint of site class interval.

The undiscounted potential net annual growth for Kansas using the above method is 68.4 million cubic feet or 56.6 cubic feet per acre. If this potential growth is discounted 10 percent, the resulting 61.6 million cubic feet or 51.0 cubic feet per acre is a better estimate, although its accuracy can only be guessed.

This potential growth is not the ultimate growth possible--higher volumes of growth can be attained by applying intensive forest management practices such as thinning, fertilization, and planting or seeding genetically superior stock.

Tree Disease Largest Known Cause of Death

Net annual mortality of growing-stock trees increased from 3.3 million cubic feet in 1964 to 3.8 million in 1980, a 15-percent gain. The mortality rate in 1964 was 0.7 percent of inventory; in 1980 it was 0.5 percent.

The largest volume of mortality was due to "unknown and other" causes, 43 percent of the total (fig. 12). This finding stems from the difficulty experienced by field crews in determining the *primary* cause of death in trees that had been dead for several years. Among the known causes of mortality, disease accounted for the largest volume, 40 percent of the total. Diseases of elm, principally Dutch elm disease, account for nearly six-tenths of the disease-caused mortality.

Mortality of sawtimber amounted to only 12.3 million board feet in 1980--0.5 percent of inventory.

Timber Removals Higher Between Surveys

Timber removals from growing stock increased from 8.3 to 14.0 million cubic feet between surveys, a 68-percent gain. Sawtimber removals jumped even higher, from 30.0 to 53.3 million board feet, a 77-percent increase.

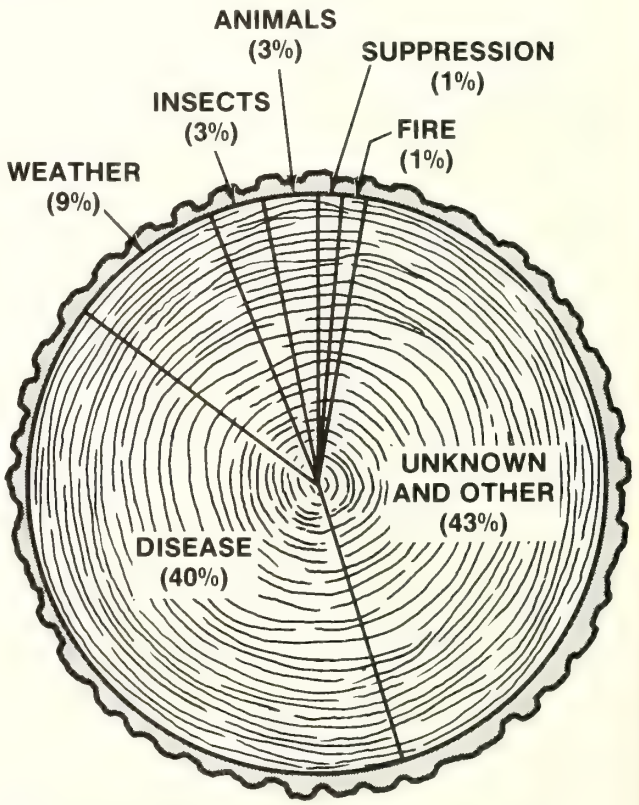

Figure 12.--*Annual mortality of growing stock on commercial forest land by cause of mortality, Kansas, 1980.*

Cottonwood accounted for the largest volume of growing-stock removals in 1980 with 1.9 million cubic feet, compared to 1.1 million cubic feet in 1964, when it represented the second largest volume. In 1964 black walnut led all other species with 1.2 million cubic feet, but by 1980 it had dropped to third place among species, even though its removals volume had increased slightly to 1.3 million cubic feet. Removals of ash were the second largest in 1980 with 1.6 million cubic feet, nearly triple the 1964 removals volume of 0.6 million cubic feet.

The picture is somewhat different for sawtimber removals. Black walnut sawtimber removals in 1980 were 8.3 million board feet--a 14-percent increase from 1964--and second only to cottonwood at 9.2 million board feet. Ash was a distant third in sawtimber removals at 5.5 million board feet. This difference is due to a high proportion of the ash volume being utilized for fuelwood, which allows use of smaller diameter trees. By contrast, virtually all the walnut volume is utilized as saw logs and veneer logs.

The volume of removals increased between surveys for most species, but declined for a few species. Removals of hickory in 1980 were one half the 1964 volume even though the growing-stock inventory more than doubled during this period. The relative scarcity of large diameter hickories is a major factor--only 17 percent of the growing-stock volume of hickory is in trees 15 inches d.b.h. and larger. The removals volumes for soft maple and elm also declined 25 percent and 19 percent, respectively, between surveys. The elm decline came at the same time the inventory of elm growing stock fell to one-third of its 1964 volume.

Eighty-six percent of the growing-stock removals (12.1 million cubic feet) were harvested for roundwood products, primarily fuelwood and saw logs. Other removals--trees removed but not used for products, or trees left standing but "removed" from the commercial forest classification by land use change--amounted to 8 percent of the removals volume (1.1 million cubic feet). Logging residue--unused trees killed by logging or the unused portion of cut trees--accounted for the remaining 6 percent of the removals volume (0.8 million cubic feet).

Fuelwood (7.6 million cubic feet) accounted for 63 percent of the volume of roundwood products from growing stock in 1980, and saw logs (4.3 million cubic feet) accounted for 36 percent. In 1964 the proportion was 35 percent for fuelwood and 45 percent for saw logs.

Ninety percent of the sawtimber removals volume (48.0 million board feet) was harvested for roundwood products. The proportion of sawtimber roundwood products in saw logs did not change much between 1964 (57 percent) and 1980 (55 percent). But the proportion of roundwood products used as fuelwood did shift from 1964 (20 percent) to 1980 (44 percent).

Although the Southeastern Unit contains only 35 percent of the State's growing-stock inventory, it accounted for 45 percent of the total removals volume. The Northeastern Unit accounted for 43 percent of the removals (44 percent of total inventory), and the Western Unit made up only 12 percent of the removals (21 percent of inventory).

Private land supplied virtually all of the removals from growing stock.

Growing-stock Growth Two-thirds Higher Than Timber Removals

One way of appraising the level of removals is to compare it with growth. This is an imperfect method because the volume of growth includes the growth from many trees too small to be part of the volume of removals.

In 1980 growing-stock removals (14.0 million cubic feet) amounted to only 60 percent of the volume of growth (23.2 million cubic feet). Sawtimber removals (53.3 million board feet) were 83 percent of growth (64.0 million board feet). These surpluses of growth over removals create the presently expanding inventory volumes.

Aboveground Biomass Estimated

Interest in whole-tree utilization is increasing as demand for wood fiber increases, as wood as an energy source is further exploited, and as costs of harvesting timber products continue to rise. An estimate of the aboveground weight of live trees and shrubs in Kansas was made as part of the inventory.

The total biomass of all live trees at least 1 inch d.b.h. on commercial forest land in the State amounts to 53.3 million green tons, an average of 44 tons per acre. The largest total biomass is in the oak-hickory forest type with 15.0 million green tons (47 tons per acre), but the greatest biomass density is in the cottonwood type where the 77 tons per acre converts to a total of 5.2 million tons. Among individual species, cottonwood contributes the largest share of biomass (6.8 million green tons), followed by hackberry (5.9 million tons), elm (4.2 million tons), bur oak (4.2 million tons), and ash (4.1 million tons).

The greatest proportion of live-tree biomass is located in growing-stock trees (64 percent). Cull trees

provide 22 percent of the State's biomass, and trees 1 to 5 inches in diameter add the remaining 14 percent:

Biomass component	Weight (Million green tons)
Growing-stock trees	
Boles	22.8
Tops and limbs	11.2
Cull trees	
Boles	7.0
Tops and limbs	4.6
1- to 5-inch trees	7.7
Total	53.3

The biomass of shrubs is greatest in the willow forest type, where these plants average 2,786 pounds per acre green weight, and in the eastern redcedar-hardwood type where they average 2,767 pounds per acre. The upland elm-ash-locust and oak-hickory types produce the next largest shrub biomass amounts, 1,065 and 986 pounds per acre, respectively. Many shrubs are important wildlife food and cover species.

Among the tall shrubs (including live trees less than 1 inch in d.b.h.), roughleaf dogwood produces the greatest average biomass with 269 pounds per acre[6]. American elm was a distant second with 76 pounds per acre, followed by green ash with 74 pounds per acre, hackberry with 38 pounds per acre, and slippery elm with 30 pounds per acre.

Buckbrush predominates among low shrubs with an average biomass of 129 pounds per acre. Poison ivy follows with 8 pounds per acre along with gooseberry-currant with 7 pounds per acre.

Table 6 summarizes the per acre biomass yields for each forest type by vegetation component.

PROJECTIONS

Projections of National Timber Supply

In the most recent projection of national demand for roundwood, annual consumption is estimated to increase from 13.3 billion cubic feet in 1976 to 25.2 billion in 2010, an 89-percent gain (USDA Forest Service 1981). Hardwood demand in the U.S. is projected to jump from 3.0 to 7.5 billion cubic feet during this period--a 150-percent increase. Demand for softwood is projected to be much higher but to increase at a slower rate, from 10.3 to 17.7 billion cubic feet--a 72-percent rise. The faster rate for hardwood demand reflects the expected increase in the use of hardwood roundwood for pulpwood and fuelwood, hardwood lumber for pallets and railroad ties, and hardwood plywood and veneer for furniture. This projection, made at a medium level of population and economic growth, assumes that the price trends in the base period used in making the projection (roughly from the late 1950's through the mid 1970's) continue through the projection period.[7] When the excess of roundwood imports (4.5 billion cubic feet) over exports (1.5 billion) is subtracted from the projected demand in 2010, the result

[6] *A weighted average based on the number of plots sampled for biomass in each forest type and the biomass of each species in the type, including types in which the shrub species was not found.*

[7] *Another projection was made under the assumption that prices will rise enough to maintain an equilibrium between projected demand and supply.*

Table 6.--*Biomass yields on commercial forest land by forest type and vegetation component, Kansas, 1981*

(In pounds per acre green weight)

Forest type	Biomass yields			
	All Components	Tall shrubs	Low shrubs	Live trees
Eastern redcedar-hardwood	44,430	2,707	60	41,663
Oak-hickory	95,903	834	152	94,917
Post-blackjack oak	93,090	200	194	92,696
Upland plains hardwoods	85,179	493	177	84,509
Elm-ash-cottonwood	88,461	582	160	87,719
Cottonwood	153,688	474	126	153,088
Willow	62,400	2,649	137	59,614
Lowland plains hardwoods	97,600	722	183	96,695
Upland elm-ash-locust	47,411	892	173	46,346
Nonstocked	31,484	189	69	31,226

is the annual demand on United States forests--22.2 billion cubic feet.

National roundwood supplies (timber available for harvest) are projected to increase from 12.1 to 18.7 billion cubic feet between 1976 and 2010.[8] Projected demand on United States forests in 2010 exceeds supply by 3.5 billion cubic feet. The short-fall is much larger for softwoods (3.3 billion cubic feet) than for hardwoods (0.2 billion).

Timber Projections for Kansas

Kansas, with its comparatively small timber resource and the primacy of hardwoods, will play a minor role in meeting the Nation's future demand-supply problems, which chiefly concern softwoods. However, the State will continue to be an important supplier of black walnut nationally. To gain perspective on what lies ahead for Kansas, we made several projections of the State's timber resource under different levels of removals.

We made two 30-year projections using the Timber Resource Analysis System (TRAS) program (Alig *et al.* 1982), a computer program for updating, backdating and projecting timber resource information. The first projection assumes a continuation of recent levels of timber removals (low removals option), and the second assumes a higher level of removals (high removals option). Softwoods and hardwoods were grouped together because the volume of softwoods is so small. TRAS uses a stand projection technique involving input of number of trees, growth rates, mortality rates, and removal rates, all by 2-inch diameter classes, along with assumed total removals by year and assumed ingrowth into the 2-inch diameter class.

Assumptions common to both options are: (1) the area of commercial forest land will remain unchanged (some decline is expected, but not enough to affect the results of the projection); (2) radial growth will decline in relation to the increase of basal area per acre of trees; (3) the intensity of forest management will continue at the rate indicated by recent trends; and (4) the volume of "other" removals will drop during the period as more of these trees are utilized for products.

Low Removals Option Projection

The low option assumes that timber removals will increase from 14.0 million cubic feet in 1980 to 25.8 million cubic feet in 2010. Growth is projected to exceed removals throughout the period, to peak about 1999, then to turn down. Growing-stock inventory, then, is projected to increase at an average annual rate of 1.81 percent or 13 million cubic feet (fig. 13). The assumed average annual change in removals used in the projections is shown in the following tabulation:

Period	Low removals option	High removals option
	(Percent annual change)	
1981-1985	0.5	2.3
1986-1990	2.2	3.6
1991-1995	3.1	3.9
1996-2000	2.5	3.7
2001-2005	2.1	3.3
2006-2010	2.0	3.1

Removals in this option increase throughout the period, ending in 2010 84 percent higher than in 1980. Removals for saw logs and fuelwood, the major roundwood products in 1980, are both expected to rise during the projection period, but more of these products will probably be recovered from "other" removals.

Growth is projected to increase from 23.2 million cubic feet in 1980 to 35.2 million cubic feet in 1999, then to turn down to 31.4 million cubic feet in 2010.

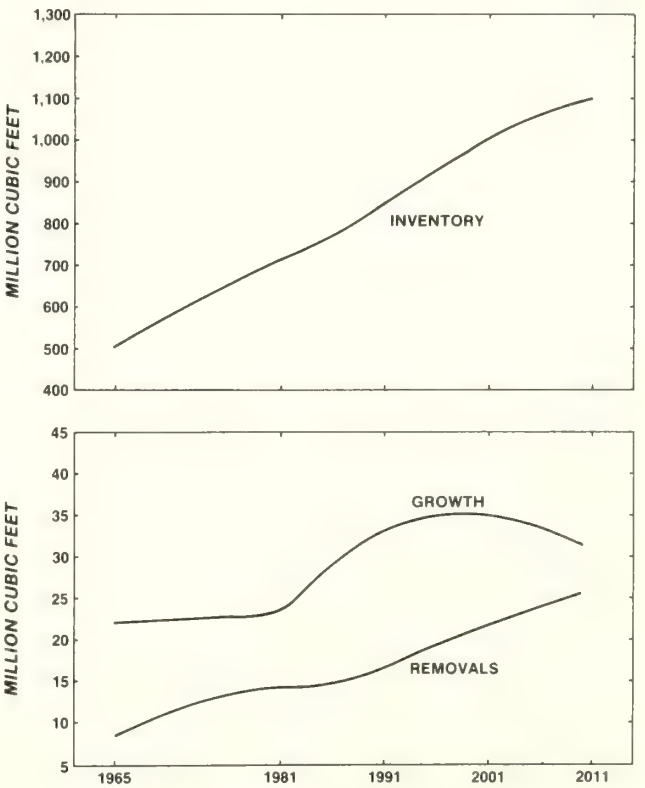

Figure 13.--*Removals, net growth, and inventory of growing stock in Kansas, 1965 and 1981, and low removals option projection for 1982-2011.*

[8]*This projection shows the volume of timber available for harvest from domestic forests if recent trends in the forces determining supply, such as commercial forest area, management levels, and prices, continue through the projection period.*

The surplus of growth over removals was 9.2 million cubic feet in 1980. This surplus is projected to grow to 16.4 million cubic feet in 1992, tapering off to 5.6 million cubic feet in 2010.

Growing-stock inventory is projected to climb during the entire period, but to increase at a slower rate during the last decade. The 1981 inventory of 711.3 million cubic feet is projected to reach 1,098.2 million cubic feet by 2011--a 54-percent gain.

High Removals Option Projection

Removals under this option reflect a higher level of harvesting than the previous option. Timber removals are projected to exceed growth by 2008, and inventory is projected to turn down at that time (fig. 14).

Timber removals jump from 14.0 million cubic feet in 1980 to 37.2 million cubic feet in 2010, a 166-percent gain. Markets for forest products are larger than assumed for the low option.

Net growth is projected to climb from 23.2 million cubic feet in 1980, peak at 35.5 million cubic feet in 2000, then fall off to 34.4 million in 2010. The excess of growth over removals in 1980, 9.2 million cubic feet, is projected to swell to 13.4 million cubic feet in 1990, then to vanish in 2008 when the growth and removals curves intersect. By 2010 the deficit of removals over growth is projected to be 2.8 million cubic feet.

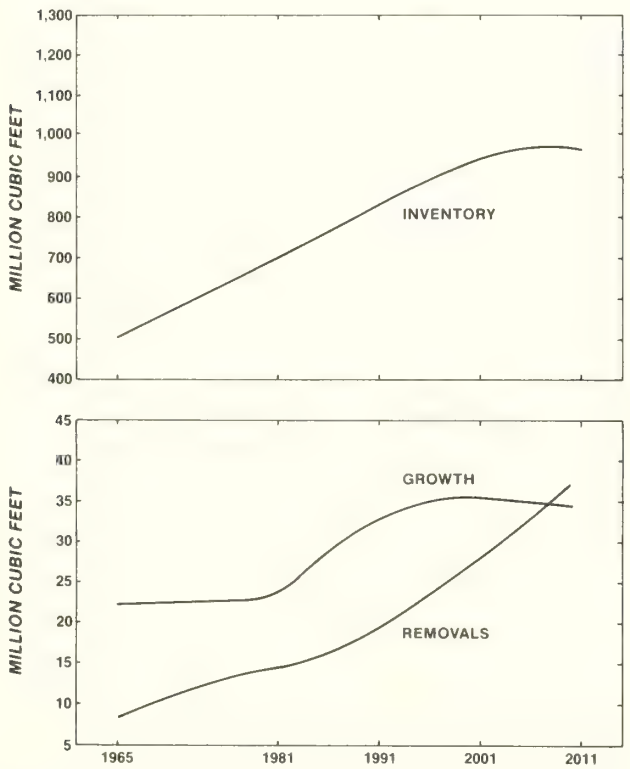

Figure 14.--*Removals, net growth, and inventory of growing stock in Kansas, 1965 and 1981, and high removals option projection for 1982-2011.*

Inventory rises more slowly than for the low option, from 711.3 million cubic feet in 1981 to a peak of 974.0 million cubic feet in 2008. Responding to the deficit of removals over growth beyond 2008, inventory then sags to 969.3 million cubic feet by 2011.

The Outlook

These projections probably represent the bounds within which the actual forest situation will develop. The low and high removals options are valid only to the extent that the assumptions upon which they are based are realized. Projections for the first decade are the most significant because rapidly changing economic, market, and social conditions may invalidate these assumptions and sharply reduce the value of projections for the last two decades.

The projections are not intended to convey desirable goals from silvicultural, social, or economic perspectives. They simply indicate what is likely to happen if forests in the State are managed much as they have been for the past 16 years and if harvesting occurs at a "high" or a "low" level.

Inventory is likely to continue accumulating at a rate close to that of current times, for about two decades, then slow down or decline during the third decade. If timber management efforts are increased beyond that of recent trends, higher growth and larger-than-projected inventories could develop toward the end of the projection period. More complete utilization of residues, tree tops and limbs, the volumes of which are not included in growing-stock inventories, is desirable and would further extend supplies of wood. The rekindled interest in fuelwood as a source of energy suggests that this may be happening. Inventories could be smaller than projected if the area of commercial forest land declines faster than assumed.

The area of the oak-hickory forest type, which surged by 71 percent from its 1965 area to become the largest type in 1981, will probably continue to gain at the expense of the upland plains hardwoods and upland elm-ash-locust types. The rate of increase, however, may slow.

Total output of fuelwood from roundwood nearly quadrupled from 1964 to 1980--from 68,000 cords to 255,000 cords. There is little reason to expect this upward trend to do anything but continue. This increased utilization for fuelwood presents both an opportunity and a threat to improved forest management. If the lower quality trees are taken for fuelwood, a market incentive will be provided to accomplish timber stand improvement to release desirable growing-

stock trees. If, on the other hand, many of the best young growing-stock trees are taken out for fuelwood, the future potential to produce quality saw logs will be greatly reduced. The key is proper landowner understanding and application of sound forest management practices.

Because nonindustrial forest landowners possess 96 percent of the commercial forest area and 94 percent of the growing-stock volume, they obviously control the destiny of the State's forest resource. Improvement in the forest situation will be slow unless many of these independent owners become convinced that timber management is economically attractive. Policies that seek to bring practical technical information and field assistance on timber sale preparation and administration along with forest management will help to bring about more positive change among forest landowners. These owners might also be persuaded by policies that make timber-growing more profitable to them, such as efforts to expand markets for timber products and to increase financial incentives for performing needed management work.

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APPENDIX

Accuracy of Survey

Forest Inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State and Survey Unit levels. Consequently, the reported figures are estimates only. However, a measure of reliability of these figures is given by sampling errors. These sampling errors mean that the chances are two out of three that if a 100-percent inventory had been taken, using the same methods, the results would have been within the limits indicated.

For example, the estimated area of commercial forest land in Kansas in 1981, 1,207.9 thousand acres, has a sampling error of ± 2.45 percent (± 29,594 acres). The commercial forest area from a 100-percent inventory, then, would be expected to fall between 1,237.5 and 1,178.3 thousand acres (1,207.9 ± 29.6), there being a one in three chance that this is not the case.

The following tabulations show sampling errors for State and Survey Unit totals of information collected during the 1981 Kansas Forest Inventory.

STATE TOTALS

Item		Sampling error
Growing stock:	(Million cubic feet)	(Percent)
Volume	711.3	3.52
Growth	23.2	5.61
Removals	14.0	17.00
Sawtimber:	(Million board feet)	
Volume	2,566.2	4.24
Growth	64.0	6.44
Removals	53.3	20.10
	(Thousand acres)	
Commercial forest area	1,207.9	2.45

NORTHEASTERN UNIT

Item		Sampling error
Growing stock:	(Million cubic feet)	(Percent)
Volume	315.1	4.82
Growth	9.7	8.05
Removals	6.0	26.37
Sawtimber:	(Million board feet)	
Volume	1,107.6	5.89
Growth	27.5	9.22
Removals	23.1	32.15
	(Thousand acres)	
Commercial forest area	588.1	3.16

SOUTHEASTERN UNIT

Item		Sampling error
Growing stock:	(Million cubic feet)	(Percent)
Volume	249.1	5.28
Growth	9.7	8.70
Removals	6.3	27.89
Sawtimber:	(Million board feet)	
Volume	828.5	6.39
Growth	27.6	9.86
Removals	24.6	31.82
	(Thousand acres)	
Commercial forest area	437.0	3.89

WESTERN UNIT

Item		Sampling error
Growing stock:	(Million cubic feet)	(Percent)
Volume	147.1	13.27
Growth	3.9	20.30
Removals	1.7	48.20
Sawtimber:	(Million board feet)	
Volume	630.1	14.18
Growth	8.9	17.76
Removals	5.6	46.36
	(Thousand acres)	
Commercial forest area	182.8	8.43

As survey data are broken down into sections smaller than State or Survey Unit totals, the sampling error increases. The smaller the breakdown, the larger the sampling error. For example, the sampling error for area of commercial forest land in a particular county is higher than that for total commercial forest area in the Survey Unit (tables 110-113 show the sampling errors for estimates smaller than State and Survey Unit totals).

SURVEY PROCEDURE

The major steps in the survey of Kansas were as follows:

1. A total of 275,271 1-acre points were systematically distributed across aerial photos of the entire State. Photo interpretors classified these points as forest land (9,570), nonforest land with trees (5,208), nonforest land without trees (258,420), questionable (424), and water (1,649), in order to make a preliminary estimate of forest area. Next, all of the forest points (9,570), 543 of the nonforest with tree points, and all of the questionable points (424) were stereo-classified as to forest type, stand-size class, and density. Then 1,386 points classed as forest, 96 points classed as questionable, and 543 points classed as nonforest with trees were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken. At each of the 937 commercial forest locations, variable-radius plots (basal area factor 37.5) were established at 10 points uniformly placed over the sample acre. Of these 937 locations, 222 were plots established during the 1965 survey and remeasured during the 1981 survey to provide improved growth and mortality information. Tree measurements made at commercial forest locations were the basis for estimates of timber volume, growth, mortality, number of trees, and other forest classifications.

2. An estimate of the volume of black walnut on nonforest land was made by establishing 10-point, variable-radius plots on nonforest ground-check locations wherever black walnut trees were found. This included black walnut trees found on fence rows or as scattered trees, but did not include walnut trees in urban areas, lawns, or in other areas where harvest of these trees is unlikely.

3. An estimate of the volume of timber on nonforest wooded strips was made by establishing 10-point, fixed-radius plots on wooded strip ground-check locations. The design and size of these plots were adjusted to allow for the narrowness of the strips.

4. Growth and mortality on commercial forest land were estimated using data collected on both remeasurement plots (those established in 1965 and remeasured in 1981) and new plots established in 1981. Growth was measured on remeasurement plots as the observed change in volume on surviving trees. Growth was estimated on new plots by using growth equations developed during the 1972 Missouri survey. Mortality on remeasurement plots was calculated as the observed volume in trees that died between surveys. On new plots, mortality was estimated by determining the volume in trees that died within 3 years of plot establishment. Growth and mortality were converted to an annual basis.

5. Statistics on timber utilization during 1980 were obtained from mill surveys. State and Extension Forestry, Kansas State University (S&EF) canvassed resident sawmills and other primary wood-using plants. The North Central Forest Experiment Station canvassed out-of-State primary wood-using mills such as sawmills and veneer mills to determine their use of timber from Kansas. State and Extension Forestry made estimates of 1980 fuelwood and post production from roundwood based on the best information available on recent output of these products. Estimates of primary mill residue used for fuelwood were obtained from the canvass of Kansas primary wood-using

plants. Timber cut for products by ownership class was determined by a canvass of public and industrial timber owners. The portion of timber harvest unaccounted for by the latter owners was grouped under "farmer and other owners".

6. Wood utilization factors for converting timber products output to timber removals for saw logs, veneer logs, and cooperage logs were obtained during the 1971-1972 Missouri utilization study. Factors for fuelwood were obtained during the 1964 Kansas utilization study. Factors for all other products were obtained during the 1959-1960 Missouri utilization study.

7. Field data were sent to St. Paul for processing and analysis.

Comparing Kansas' Third Survey with the Second Survey

Data from new forest surveys are often compared with data from earlier ones to determine trends in forest areas and volumes. Changes in procedures and definitions between surveys make it necessary to adjust earlier survey data to make them comparable with data from the new survey.

We adjusted the published 1965 area of commercial forest land, 1,192.4 thousand acres, by subtracting 900 acres that were classed commercial forest in 1965, but were Christmas tree production areas (productive-reserved forest land) in 1981. The adjusted 1965 area (1,191.5 thousand acres) can be compared directly with the 1981 area (1,207.9 thousand acres).

A test was made to ensure that we could move from the adjusted 1965 volumes to the new 1981 volumes by means of Timber Resource Analysis System (TRAS), a Forest Service computer program for updating, backdating, and projecting timber volume, growth, mortality, and removals. TRAS recalculated 1965 volumes using 1981 estimates of cubic foot volume per tree and 1981 board foot-cubic foot ratios. The volumes had to be adjusted so that differences between surveys represented actual change and not merely change in the volume equations used.

LOG GRADE

The butt log of every sawtimber tree on every full permanent sample plot, remeasurement plot, and nonforest plot with black walnut trees (4,194 trees) was graded for quality. Logs were graded on the basis of external characteristics. Hardwood species were graded according to "Hardwood Log Grades for Standard Lumber" (Vaughn *et al.* 1966). The best 12-foot section of the lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log-grade standards, was graded as follows:

Forest Service standard grades for hardwood factory saw logs

Grading factors		Specifications							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Scaling diameter, inches		13-15[1]	16-19	20+	11+[2]	12+			8+
Length without trim, feet			10+		10+	8-9	10-11	12+	8+
Required clear cuttings[3] of each of three best faces[4]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No Limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance	For logs with less than one-fourth of end in sound defects		15 percent			30 percent			50 percent
	For logs with more than one-fourth of end in sound defects		10 percent			20 percent			35 percent
Maximum scaling deduction			40 percent[5]			50 percent[6]			50 percent

[1]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[2]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[3]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[4]A face is one-fourth of the surface of the log as divided lengthwise.
[5]Otherwise #1 logs with 41-60 percent deductions can be #2.
[6]Otherwise #2 logs with 51-60 percent deductions can be #3.

Forest Service standard specifications for hardwood construction logs (tie and timber logs)[1]

Position in tree		Butt and upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		One-fourth of the diameter at the small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of one-third of log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed one-third of log diameters at point of occurrence.
	Holes	Any number provided none has a diameter over one-third of log diameter at point of occurrence, and none extends over 3 inches into included timber.[2]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[2] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit one shake not to exceed one-fourth of the scaling diameter and will admit a longitudinal split not extending over 5 inches into the contained timber.

[1]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only nonfactory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, then it may be necessary to subdivide the class into grades.

[2]Included timber is always square, and dimension is judged from small end.

Softwood species were graded according to the following specifications:

LOG GRADES FOR SOFTWOOD LOGS

Grade 1

1. Logs must be 16 inches or larger, 10 feet or longer, and with deduction for defect not over 30 percent of gross scale.
2. Logs must be at least 75 percent clear on each of three faces.
3. All knots outside clear cutting must be sound and not over 2½ inches in diameter.

Grade 2

1. Logs must be 12 inches or larger, 10 feet or longer, and with a net scale after deduction for defect of at least 50 percent of the gross contents of the log.
2. Logs must be at least 50 percent clear on each of three faces or 75 percent clear on two faces.

Grade 3

1. Logs must be 6 inches or larger, 8 feet or longer, and with a net scale after deduction for defect of at least 50 percent of the gross contents of the log.

Note: A) Diameters are diameter inside bark at small end of log.
B) Percent clear refers to percent clear in one continuous section.

PRINCIPAL TREE AND SHRUB SPECIES GROUPS IN KANSAS[9]

Tree Species

SOFTWOODS
- Eastern redcedar ..... *Juniperus virginiana*

HARDWOODS
- Bur oak ..... *Quercus macrocarpa*
- Select white oaks
  - White oak ..... *Quercus alba*
  - Chinkapin oak ..... *Quercus muehlenbergii*
- Other white oaks
  - Post oak ..... *Quercus stellata*
- Select red oaks
  - Northern red oak ..... *Quercus rubra*
  - Shumard oak ..... *Quercus shumardii*
- Other red oaks
  - Black oak ..... *Quercus velutina*
  - Blackjack oak ..... *Quercus marilandica*
  - Pin oak ..... *Quercus palustris*
  - Shingle oak ..... *Quercus imbricaria*
- Select hickory
  - Shellbark hickory ..... *Carya laciniosa*
  - Mockernut hickory ..... *Carya tomentosa*
  - Shagbark hickory ..... *Carya ovata*
- Other hickory
  - Bitternut hickory ..... *Carya cordiformis*
  - Black hickory ..... *Carya texana*
- Pecan ..... *Carya illinoensis*
- Hard maple
  - Sugar maple ..... *Acer saccharum*
- Soft maple
  - Silver maple ..... *Acer saccharinum*
- Ash
  - Green ash ..... *Fraxinus pennsylvanica*
  - White ash ..... *Fraxinus americana*
- Cottonwood
  - Eastern cottonwood ..... *Populus deltoides*
- Basswood
  - American basswood ..... *Tilia americana*
- Elm
  - American elm ..... *Ulmus americana*
  - Siberian elm ..... *Ulmus pumila*
  - Slippery elm ..... *Ulmus rubra*
- Black walnut ..... *Juglans nigra*
- Willow
  - Black willow ..... *Salix nigra*
- Boxelder ..... *Acer negundo*
- Hackberry ..... *Celtis occidentalis*
- Sycamore ..... *Platanus occidentalis*
- Other hardwoods
  - Black cherry ..... *Prunus serotina*
  - Black locust ..... *Robinia pseudoacacia*
  - Honeylocust ..... *Gleditsia triacanthos*
  - Kentucky coffeetree ..... *Gymnocladus dioicus*
  - Northern catalpa ..... *Catalpa speciosa*
  - Common persimmon ..... *Diospyros virginiana*
  - Red mulberry ..... *Morus rubra*
  - River birch ..... *Betula nigra*
  - Sugarberry ..... *Celtis laevigata*
- Noncommercial species
  - Texas buckeye ..... *Aesculus glabra* var. *arguta*
  - Ailanthus ..... *Ailanthus altissima*
  - Eastern redbud ..... *Cercis canadensis*
  - Hawthorn ..... *Crataegus* spp.
  - Osage-orange ..... *Maclura pomifera*
  - Eastern hophornbeam ..... *Ostrya virginiana*

SHRUB SPECIES

TALL SHRUBS
- Roughleaf dogwood ..... *Cornus drummondii*
- Chokecherry ..... *Prunus virginiana*
- Wild plum ..... *Prunus* spp.
- Pawpaw ..... *Asimina triloba*
- Beaked hazel ..... *Corylus cornuta*
- Prickly ash ..... *Xanthoxylum americanum*
- Viburnum ..... *Viburnum* spp.
- Elder ..... *Sambucus* spp.
- Sumac ..... *Rhus* spp.
- Buttonbush ..... *Cephalanthus occidentalis*

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[9]*The common and scientific names of tree species are based on: Little, Elbert L., Jr. 1979. The common and scientific names of shrubs are based on: Fernald, Merritt L. 1950.*

Wahoo ..... *Euonymus atropurpureus*
Willow ..... *Salix* spp.
Sassafras ..... *Sassafras albidum*

LOW SHRUBS

Virginia creeper ..... *Parthenocissus* spp.
Gooseberry-currant ..... *Ribes* spp.
Raspberry-blueberry ..... *Rubus* spp.
Rose ..... *Rosa* spp.
American bladdernut ..... *Staphylea trifolia*
Bilberry-blackberry ..... *Vaccinium* spp.
Honeysuckle ..... *Lonicera* spp.
Buckbrush ..... *Symphoricarpos* spp.
Poison ivy ..... *Rhus radicans*
Pipe-vine ..... *Aristolochia tomentosa*
Moonseed ..... *Menispermum canadense*
Greenbrier ..... *Smilax* spp.
Grape ..... *Vitis* spp.

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
Breast height = 1.4 meters above the ground.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 pound = 0.454 kilogram.
1 ton = 0.907 metric ton.

DEFINITION OF TERMS

Acceptable trees.--Growing-stock trees of commercial species that meet specified standards of size and quality, but do not qualify as desirable trees.

Area-condition classes.--*Class 10*.--Areas fully stocked with desirable trees but not overstocked.

Class 20.--Areas fully stocked with desirable trees, but overstocked with all live trees.

Class 30.--Areas medium to fully stocked with desirable trees, and with less than 30 percent of the area controlled by other trees and/or inhibiting vegetation or surface conditions that will prevent occupancy by desirable trees.

Class 40.--Areas medium to fully stocked with desirable trees and with 30 percent or more of the area controlled by other trees and/or conditions that ordinarily prevent occupancy by desirable trees.

Class 50.--Areas poorly stocked with desirable trees, but fully stocked with growing-stock trees.

Class 60.--Areas poorly stocked with desirable trees, but with medium to full stocking of growing-stock trees.

Class 70.--Areas poorly stocked with desirable trees, and poorly stocked with growing-stock trees.

Basal area.--The area in square feet of the cross section at breast height of a single tree. When the basal areas of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

Biomass.--The aboveground volume of all live trees (including bark and foliage). Biomass is made up of 5 components:

Growing-stock bole.--Biomass of a growing-stock tree from a 1-foot stump to a 4-inch top.

Growing-stock tops and limbs.--Biomass of a growing-stock tree from a 1-foot stump minus the growing-stock bole.

Cull bole.--Biomass of a cull tree from a 1-foot stump to a variable 4-inch top.

Cull tops and limbs.--Biomass of a cull tree from a 1-inch stump minus the cull bole.

1- to 5-inch trees.--Biomass of all live trees 1 to 5 inches in diameter at breast height.

Commercial forest land.--Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization (Note: Areas qualifying as commercial forest land can produce more than 20 cubic feet per acre per year of annual growth under management. Currently inaccessible and inoperable areas are included, except when the areas involved are small and unlikely to become suitable for production of industrial wood in the foreseeable future.) Also see definition of pastured commercial forest land.

Commercial species.--Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

County and municipal land.--Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Cropland.--Land under cultivation within the past 24 months, including cropland harvested, crop failures, cultivated summer fallow, idle cropland used only for pasture, orchards, and land in soil improvement crops, but excluding land cultivated in developing improved pasture.

Cull.--Portions of a tree that are unusable for industrial wood products, because of rot, form, or other defect.

Desirable trees.--Growing-stock trees having no serious defects in quality limiting present or prospective use, and of relatively high vigor, and containing no pathogens that may result in death or serious deterioration before rotation age. These are trees that would be favored by forest managers in silvicultural operations.

Diameter classes.--A classification of trees based on diameter outside bark, measured at breast height (4½ feet above the ground). (Note: d.b.h. is the com-

mon abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h. inclusive.)

Farm.--Any place from which $1,000 or more of agricultural products were produced and sold during the year.

Farmer-owned land.--Land owned by operators of farms. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparison of basal area and/or number of trees, by age or size and spacing with specified standards.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions of land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, nonforest land, and water.

Forest industry land.--Land owned by companies or individuals operating primary wood-using plants.

Forest trees.--Woody plants having a well-developed stem and usually more than 12 feet in height at maturity.

Forest types.--A classification of forest land based upon the species forming a plurality of live tree stocking. Major forest types in Kansas are:

Eastern redcedar-hardwood.--Forests in which hardwoods comprise a plurality of the stocking but in which eastern redcedar comprises 25 percent or more of the stocking. Found on dry uplands, usually abandoned pastures or fields.

Oak-hickory.--Forests in which upland oaks (white, northern red, black) or hickory, singly or in combination, comprise a plurality of the stocking, except for stands classed as eastern redcedar-hardwood or as post-blackjack oak. Occurs on a variety of soils.

Post-blackjack oak.--Forests in which post oak or blackjack oak, singly or in combination, comprise a majority of the stocking. Occurs on dry uplands and ridges.

Upland plains hardwoods.--Forests in which black walnut, hackberry, and bur oak, singly or in combination, comprise a plurality of the stocking. Commonly found on slopes and uplands.

Elm-ash-cottonwood.--Lowland forest in which elm, ash, cottonwood, and willow, singly or in combination, comprise a plurality of the stocking, except for those in which cottonwood or willow comprise a majority of the stocking. Found on first or second bottoms of major streams.

Cottonwood.--Forests in which cottonwood comprises a majority of the stocking.

Willow.--Forests in which willow comprises a majority of the stocking.

Lowland plains hardwoods.--Forests in which black walnut, hackberry, bur oak, soft maple, and boxelder, singly or in combination, comprise a plurality of the stocking. Commonly found in coves and bottomlands.

Upland elm-ash-locust.--Upland forests in which elm, ash, and honeylocust, singly or in combination, comprise a plurality of the stocking. Includes shelterbelts and windbreaks on sites drier than those commonly associated with lowland species.

Gross area.--The entire area of land and water as determined by the Bureau of the Census, 1980.

Growing-stock trees.--Live trees of commercial species qualifying as desirable and acceptable trees. (Note: Excludes rough, rotten, and dead trees.)

Growing-stock volume.--Net volume in cubic feet of growing-stock trees 5 inches d.b.h. and over, from a 1-foot stump to a minimum 4 inch top diameter outside bark of the central stem, or to the point where the central stem breaks into limbs. Cubic feet can be converted to cords by dividing by 79 cubic feet per solid wood cord.

Hardwoods.--Dicotyledonous trees, usually broad-leaved and deciduous.

Idle farmland.--Includes former croplands, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.--Land currently improved for grazing by cultivation, seeding, irrigation, or clearing of trees or brush, and less than 16.7 percent stocked with live trees.

Indian land.--All lands held in trust by the United States for individual Indians or tribes, or all lands, titles to which are held by individual Indians or tribes, subject to Federal restrictions against alienation.

Industrial wood.--All roundwood products, except fuelwood.

Land area.--*A. Bureau of the Census.* The area of dry land and land temporarily or partly covered by water, such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than ⅛ of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

B. *Forest Inventory and Analysis.* The same as the Bureau of the Census, except minimum width of streams, etc. is 120 feet and minimum size of lakes, etc. is 1 acre.

Live trees.--Growing-stock, rough and rotten trees 1 inch d.b.h. and larger.

Log grades.--A classification of logs based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.--The unused growing-stock portions of trees cut or killed by logging.

Maintained road.--Any road, hard-topped or other surface, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

Marsh.--Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

Merchantable.--Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

Miscellaneous federal land.--Federal land other than National Forest, primarily land administered by the Bureau of Land Management.

Miscellaneous private land.--Privately owned land other than forest industry and farmer-owned land.

Mortality.--The volume of sound wood in growing-stock and sawtimber trees that die annually.

National forest land.--Federal land that has been legally designated as National Forests or purchase units, and other land under the administration of the USDA Forest Service.

Net annual growth of growing-stock.--The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.--The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.--Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.--(a) Unproductive forest land and (b) productive-reserved forest land. See definitions of unproductive and productive-reserved forest land.

Noncommercial species.--Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land.--Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide and more than 1 acre in size to qualify as nonforest land.)

a. *Nonforest land without trees.*--Nonforest land with no live trees present.

b. *Nonforest land with trees.*--Nonforest land with one or more trees at least 5 inches in d.b.h. per acre.

Nonstocked land.--Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other removals.--Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the commercial forest land classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership.--Property owned by one owner, regardless of the number of parcels in a specified area.

Ownership size class.--The amount of commercial forest land owned by one owner, regardless of the number of parcels.

Owner tenure.--The length of time a property has been held by the owner.

Pasture and range.--Land currently improved for grazing by cultivation, seeding, or irrigation plus land on which the natural plant cover is composed principally of native grasses, forbs, or shrubs valuable for forage.

Pastured commercial forest land.--Commercial forest land for which the primary use is wood production, but presently used for grazing.

Physiographic class.--A measure of soil and water conditions that affect tree growth on a site. Physiographic classes used in Forest Inventory and Analysis inventories are:

Xeric sites.--Very dry droughty sites where excessive drainage seriously limits both growth and species occurrence. These sites are usually on upland and upper half slopes.

Xeromesic sites.--Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. These sites are usually on the lower half slope.

Mesic sites.--Deep, well-drained soils. Growth and species occurrence are limited only by climate. These include all cove sites and bottomlands along intermittent streams.

Hydromesic sites.--Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent.

These include first and second bottoms on all major creeks and rivers.

Hydric sites.--Very wet sites where excess water seriously limits both growth and species occurrence.

Plant byproducts.--Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.--Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stands.--(See stand-size class.)

Poletimber trees.--Growing-stock trees of commercial species at least 5 inches in d.b.h., but smaller than sawtimber size.

Productive-reserved forest land.--Forest land sufficiently productive to qualify as commercial forest land, but withdrawn from timber utilization through statute, administrative regulation, designation, or exclusive use for Christmas-tree production, as indicated by annual shearing.

Rotten trees.--Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, because they do not meet Regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of the cull volume in a tree is rotten.

Rough trees.--(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, because they do not meet Regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.--Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs; veneer logs and bolts; cooperage logs and bolts; pulpwood; fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round; split; or hewn products.)

Salvable dead trees.--Standing or down dead trees that are considered merchantable by Regional standards.

Saplings.--Live trees 1 inch to 5 inches in d.b.h.

Sapling-seedling stands.--(See stand-size class.)

Saw log.--A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by Regional standards.

Saw log portion.--That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.--The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

Sawtimber stands.--(See stand-size class.)

Sawtimber trees.--Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting Regional specifications for freedom from defect. Softwoods must be at least 9 inches in d.b.h. Hardwoods must be at least 11 inches in d.b.h.

Sawtimber volume.--Net volume of the saw log portion of live sawtimber in board feet, International ¼-inch rule, from stump to a minimum 7 inches top d.o.b. for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Seedlings.--Live trees less than 1 inch in d.b.h. that are expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).--Live trees of commercial species that contain one merchantable 8- to 11-foot saw log but not a 12-foot saw log or two noncontiguous 8- to 11-foot saw logs, now or prospectively.

Shrub.--A woody, perennial plant differing from a perennial herb in its persistent and woody stem(s), and less definitely from a tree in its lower stature and/or the general absence of a well-defined main stem. For this report shrubs were separated somewhat arbitrarily into tall and low shrubs as follows:

Tall shrubs.--Shrubs normally taller than 1.6 to 3.2 feet (0.5 to 1.0 meter).

Low shrubs.--Shrubs normally shorter than 1.6 to 3.2 feet (0.5 to 1.0 meter). (Woody perennial vines, such as grape, were included with low shrubs.)

Shrub biomass.--The total above-ground volume (including the bark) of selected shrubs and trees less than 1-inch d.b.h.

Site classes.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Site index.--An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.--Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.--A growth of trees on a minimum of 1 acre of forest land stocked by forest trees of any size.

Stand-age class.--Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.--The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.--A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and

saplings.

a. *Sawtimber stands.*--Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

b. *Poletimber stands.*--Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

c. *Sapling-seedling stands.*--Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

d. *Nonstocked stands.*--Stands in which stocking of growing-stock trees is less than 16.7 percent.

State land.--Land owned by States, or land leased to these governmental units for 50 years or more.

Stocking.--The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

Overstocked stands.--Stands in which stocking of trees is 134.0 percent or more.

Fully stocked stands.--Stands in which stocking of trees is from 101.0 to 133.9 percent.

Medium stocked stands.--Stands in which stocking of trees is from 61.0 to 100.9 percent.

Poorly stocked stands.--Stands in which stocking of trees is from 16.7 to 60.9 percent.

Nonstocked areas.--Commercial forest land on which stocking of trees is less than 16.7 percent.

Timber removals from growing stock.--The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals.

Timber removals from sawtimber.--The net board-foot volume of live sawtimber trees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timber products output.--All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edging, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree biomass.--The total aboveground volume (including the bark) of all trees 1 to 5 inches in d.b.h., and the total aboveground volume (including the bark) from a 1-foot stump for trees more than 5 inches in d.b.h.

Tree size class.--A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

Unproductive forest land.--Forest land incapable of producing 20 cubic feet per acre of annual growth or of yielding crops of industrial wood under natural conditions because of adverse site conditions. (Note: Adverse conditions include shallow soils, dry climate, poor drainage, high elevation, steepness, and rockiness.)

Upper stem portion.--That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4 inches outside bark or to the point where the central stem breaks into limbs.

Urban and other areas.--Areas within the legal boundaries of cities, and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards; cemeteries; roads, railroads, airports; beaches; powerlines; and other rights-of-way; or other nonforest land not included in any other specified land use class.

Water.--(a) *Bureau of the Census.* — Streams, sloughs, estuaries, and canals more than one-eighth of a statute mile wide, and lakes, reservoirs, and ponds more than 40 acres in area.

(b) *Noncensus.*--The same as the Bureau of the Census, except minimum width of streams, etc. is 120 feet and minimum size of lakes, etc. is 1 acre.

Windbreak.--A group of trees less than 120 feet wide used for the protection of soil, cropfields, and buildings in use.

Wooded pasture.--Improved pasture with more than 16.7 percent stocking in live trees, but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or there is other evidence of grazing. (Nonforest land with trees).

Wooded strip.--An acre or more of natural continuous forest land that would otherwise meet survey standards for commercial forest land except that it is less than 120 feet wide. (Nonforest land with trees).

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Table 7.--Area of land by land class, Kansas, 1965 and 1981

(In thousand acres)

Land class	1965[1/]	1981
Forest land		
Commercial forest land		
Eastern redcedar-hardwood	2.7	27.5
Oak-hickory	185.3	316.6
Post-blackjack oak	27.3	30.9
Upland plains hardwoods	113.1	49.4
Elm-ash-cottonwood	192.9	289.6
Cottonwood	65.0	68.1
Willow	8.7	4.2
Lowland plains hardwoods	220.7	265.9
Upland elm-ash-locust	228.6	110.3
Nonstocked	147.2	45.4
Subtotal	1,191.5	1,207.9
Noncommercial forest land		
Unproductive	157.4	128.4
Productive-reserved	0.9	22.4
Subtotal	158.3	150.8
Total	1,349.8	1,358.7
Nonforest land	51,160.9	50,979.3
All land	52,510.7	52,338.0

[1/] Figures have been adjusted from those published after the 1965 survey to conform to 1981 areas because of changes in survey definitions and procedures.

Table 8.--Area of land by land class and Forest Survey Unit, Kansas, 1981

(In thousand acres)

Land class	All units	Forest Survey Unit: Northeastern unit	Forest Survey Unit: Southeastern unit	Forest Survey Unit: Western unit
FOREST LAND				
Commercial forest land				
Unpastured commercial forest	825.1	401.4	284.5	139.2
Pastured commercial forest[1/]	382.8	186.7	152.5	43.6
Subtotal	1,207.9	588.1	437.0	182.8
Noncommercial forest land				
Unproductive	128.4	21.0	97.0	10.4
Productive-reserved	22.4	15.1	2.3	5.0
Subtotal	150.8	36.1	99.3	15.4
Total	1,358.7	624.2	536.3	198.2
NONFOREST LAND				
Nonforest with trees				
Cropland	63.0	30.2	13.6	19.2
Improved pasture[2/]	533.6	139.4	225.2	169.0
Wooded strips[3/]	150.0	62.6	50.3	37.1
Idle farmland	23.9	4.1	2.5	17.3
Marsh	22.7	4.2	4.3	14.2
Windbreaks[4/]	186.3	43.0	66.9	76.4
Wooded pasture[2/]	209.8	60.5	95.2	54.1
Subtotal	1,189.3	344.0	458.0	387.3
Nonforest without trees				
Cropland	32,163.2	5,026.1	3,850.3	23,286.8
Improved pasture[2/]	15,827.4	1,922.7	4,549.0	9,355.7
Idle farmland	7.5	2.9	4.6	0
Marsh	56.3	1.5	6.9	47.9
Other farm-farmstead	198.9	67.0	35.4	96.5
Urban and other	1,417.9	374.3	338.5	705.1
Noncensus water	118.8	32.2	34.3	52.3
Subtotal	49,790.0	7,426.7	8,819.0	33,544.3
Total	50,979.3	7,770.7	9,277.0	33,931.6
TOTAL LAND[5/]	52,338.0	8,394.9	9,813.3	34,129.8
WATER (BUREAU OF THE CENSUS)[5/]	319.5	155.9	77.5	86.1
TOTAL LAND AND WATER[5/]	52,657.5	8,550.8	9,890.8	34,215.9

[1/] Forest land for which the primary use is wood production, but is used for grazing.

[2/] Includes areas classified as range by the USDA Soil Conservation Service.

[3/] An acre or more of natural continuous forest land less than 120 feet wide that would otherwise meet survey standards.

[4/] A group of trees less than 120 feet wide used for the protection of soil, cropfields, and buildings in use.

[5/] U.S. Department of Commerce, Bureau of the Census. 1980. State/county area measurement reports (unpublished).

Table 9.--Area of land and forest land by county, Kansas, 1981

County	Land area[1/]	Forest land: All forest	Forest land: Non-commercial	Forest land: Commercial	Forest land: Percent commercial forest	Nonforest land with trees: All nonforest with trees	Nonforest land with trees: Wooded strips	Nonforest land with trees: Other nonforest with trees	Nonforest land with trees: Percent nonforest with trees
	Thousand acres				Percent		Thousand acres		Percent
NORTHEASTERN UNIT									
Atchison	275.7	24.8	1.0	23.8	8.6	8.3	1.8	6.5	3.0
Brown	365.8	19.7	1.0	18.7	5.1	9.5	1.3	8.2	2.6
Clay	404.2	16.0	0.7	15.3	3.8	5.0	0.9	4.1	1.2
Dickinson	545.4	14.0	0.5	13.5	2.5	7.0	1.2	5.8	1.3
Doniphan	248.0	29.9	1.2	28.7	11.6	12.9	1.9	11.0	5.2
Douglas	294.9	30.0	1.9	28.1	9.5	20.5	2.5	18.0	7.0
Franklin	369.4	27.3	1.6	25.7	7.0	14.6	2.5	12.1	4.0
Geary	241.2	21.1	2.5	18.6	7.7	9.5	1.5	8.0	3.9
Jackson	420.9	33.5	1.1	32.4	7.7	24.2	6.4	17.8	5.7
Jefferson	342.6	43.5	2.5	41.0	12.0	22.6	3.0	19.6	6.6
Johnson	305.9	27.4	1.4	26.0	8.5	13.7	2.1	11.6	4.5
Leavenworth	296.0	45.8	2.5	43.3	14.6	23.2	5.9	17.3	7.8
Marshall	561.7	31.5	1.8	29.7	5.3	30.4	4.0	26.4	5.4
Miami	377.5	47.9	1.6	46.3	12.3	23.0	5.2	17.8	6.1
Nemaha	459.9	16.9	0.6	16.3	3.5	7.3	1.8	5.5	1.6
Osage	444.7	34.4	3.2	31.2	7.0	21.1	3.4	17.7	4.7
Pottawatomie	529.8	44.4	3.5	40.9	7.7	20.4	3.7	16.7	3.9
Riley	379.6	35.0	2.8	32.2	8.5	20.1	2.2	17.9	5.3
Shawnee	351.2	26.9	1.3	25.6	7.3	14.8	2.2	12.6	4.2
Wabaunsee	510.1	31.8	2.5	29.3	5.7	15.7	3.2	12.5	3.1
Washington	575.0	14.8	0.5	14.3	2.5	18.4	5.4	13.0	3.2
Wyandotte	95.4	7.6	0.4	7.2	7.5	1.8	0.5	1.3	1.9
All counties	8,394.9	624.2	36.1	588.1	7.0	344.0	62.6	281.4	4.1
SOUTHEASTERN UNIT									
Allen	323.3	11.4	1.4	10.0	3.1	17.3	2.2	15.1	5.4
Anderson	373.5	19.5	3.9	15.6	4.2	18.9	2.1	16.8	5.1
Bourbon	408.4	43.4	8.3	35.1	8.6	48.1	2.0	46.1	11.8
Butler	923.7	24.1	2.9	21.2	2.3	36.4	6.5	29.9	3.9
Chase	497.2	10.5	0.6	9.9	2.0	14.4	2.1	12.3	2.9
Chautauqua	412.0	67.8	19.3	48.5	11.8	29.3	3.0	26.3	7.1
Cherokee	377.9	27.0	5.0	22.0	5.8	27.1	2.8	24.3	7.2
Coffey	393.6	12.5	2.5	10.0	2.5	13.8	0.9	12.9	3.5
Cowley	721.7	28.1	2.8	25.3	3.5	14.4	2.9	11.5	2.0
Crawford	380.7	24.2	2.4	21.8	5.7	27.2	3.3	23.9	7.1
Elk	416.0	37.4	9.7	27.7	6.7	16.7	1.5	15.2	4.0
Greenwood	726.2	29.0	3.8	25.2	3.5	34.5	5.1	29.4	4.8
Labette	417.8	20.2	4.2	16.0	3.8	18.2	1.0	17.2	4.4
Linn	384.5	56.6	7.9	48.7	12.7	24.9	3.2	21.7	6.5
Lyon	540.5	12.4	1.2	11.2	2.1	11.5	2.4	9.1	2.1
Marion	604.2	9.3	1.9	7.4	1.2	6.6	0.8	5.8	1.1
Montgomery	413.3	29.4	6.5	22.9	5.5	19.7	2.2	17.5	4.8
Morris	443.3	7.8	0.9	6.9	1.6	6.8	1.4	5.4	1.5
Neosho	368.7	17.1	3.3	13.8	3.7	16.2	1.1	15.1	4.4
Wilson	368.0	32.8	7.6	25.2	6.8	40.8	2.3	38.5	11.1
Woodson	318.8	15.8	3.2	12.6	4.0	15.2	1.5	13.7	4.8
All counties	9,813.3	536.3	99.3	437.0	4.5	458.0	50.3	407.7	4.7

(Table 9 continued on next page)

[1/] U.S. Department of Commerce, Bureau of the Census. 1980. State/county area measurement reports (unpublished).

(Table 9 continued)

WESTERN UNIT

County	Land area[1/]	Forest land				Nonforest land with trees			
		All forest	Non-commercial	Commercial	Percent commercial forest	All nonforest with trees	Wooded strips	Other nonforest with trees	Percent nonforest with trees
	Thousand acres				Percent	Thousand acres			Percent
Barber	727.2	6.9	0.3	6.6	0.9	17.5	2.2	15.3	2.4
Barton	573.1	1.1	--	1.1	0.2	0.5	0.1	0.4	0.1
Cheyenne	653.4	2.7	--	2.7	0.4	6.2	1.7	4.5	0.9
Clark	624.0	5.1	0.4	4.7	0.8	8.3	0.6	7.7	1.3
Cloud	459.3	8.7	0.1	8.6	1.9	5.5	0.1	5.4	1.2
Comanche	504.8	1.2	0.2	1.0	0.2	5.8	0.4	5.4	1.1
Decatur	572.0	2.3	--	2.3	0.4	2.1	0.8	1.3	0.4
Edwards	396.5	1.7	--	1.7	0.4	1.3	0.2	1.1	0.3
Ellis	576.3	2.7	--	2.7	0.5	4.0	0.3	3.7	0.7
Ellsworth	458.9	3.1	--	3.1	0.7	3.0	0.6	2.4	0.7
Finney	833.3	0.4	--	0.4	--	0.4	0.1	0.3	--
Ford	703.2	0.9	0.2	0.7	0.1	5.7	0.4	5.3	0.8
Gove	686.0	0.1	--	0.1	--	1.8	--	1.8	0.3
Graham	575.0	4.9	0.2	4.7	0.8	7.4	1.0	6.4	1.3
Grant	368.1	0.3	0.2	0.1	--	2.9	0.1	2.8	0.8
Gray	555.2	2.3	--	2.3	0.4	0.5	0.1	0.4	0.1
Greeley	498.2	0.1	--	0.1	--	0.3	--	0.3	0.1
Hamilton	638.4	3.5	0.2	3.3	0.5	3.0	0.4	2.6	0.5
Harper	513.3	5.1	0.4	4.7	0.9	17.7	1.4	16.3	3.4
Harvey	345.9	1.9	0.2	1.7	0.5	6.8	0.7	6.1	2.0
Haskell	369.7	--	--	--	--	--	--	--	--
Hodgeman	550.7	--	--	--	--	0.1	--	0.1	--
Jewell	582.2	11.1	1.3	9.8	1.7	12.1	1.5	10.6	2.1
Kearny	555.3	0.7	0.2	0.5	0.1	0.3	--	0.3	0.1
Kingman	553.9	8.0	1.0	7.0	1.3	21.6	1.6	20.0	3.9
Kiowa	462.6	0.7	0.1	0.6	0.1	2.5	1.2	1.3	0.5
Lane	459.1	0.1	--	0.1	--	--	--	--	--
Lincoln	460.6	3.3	0.2	3.1	0.7	8.1	0.9	7.2	1.8
Logan	686.9	1.0	--	1.0	0.1	0.4	0.1	0.3	0.1
McPherson	576.1	4.0	0.2	3.8	0.7	6.0	0.7	5.3	1.0
Meade	626.3	2.1	0.2	1.9	0.3	1.6	0.1	1.5	0.3
Mitchell	459.1	8.4	1.4	7.0	1.5	24.8	1.5	23.3	5.4
Morton	467.9	2.6	0.2	2.4	0.5	1.6	0.4	1.2	0.3
Ness	687.7	0.4	--	0.4	0.1	0.1	--	0.1	--
Norton	558.6	3.3	0.3	3.0	0.5	5.7	0.7	5.0	1.0
Osborne	564.4	6.5	0.2	6.3	1.1	6.1	0.7	5.4	1.1
Ottawa	461.3	7.3	0.6	6.7	1.5	9.0	0.3	8.7	2.0
Pawnee	483.1	2.3	0.4	1.9	0.4	8.5	1.6	6.9	1.8
Phillips	567.5	7.4	1.4	6.0	1.1	22.4	1.7	20.7	3.9
Pratt	470.5	1.6	--	1.6	0.3	0.6	0.1	0.5	0.1
Rawlins	684.4	2.2	0.2	2.0	0.3	1.8	0.4	1.4	0.3
Reno	805.6	7.3	1.0	6.3	0.8	23.9	0.9	23.0	3.0
Republic	459.9	8.7	0.5	8.2	1.8	10.8	0.9	9.9	2.3
Rice	465.9	1.8	0.2	1.6	0.3	3.4	0.2	3.2	0.7
Rooks	568.7	6.9	0.5	6.4	1.1	16.3	1.4	14.9	2.9
Rush	459.5	0.1	--	0.1	--	0.2	0.1	0.1	--
Russell	556.4	4.6	0.1	4.5	0.8	1.5	0.2	1.3	0.3

(Table 9 continued on next page)

[1/] U.S. Department of Commerce, Bureau of the Census. 1980. State/county area measurement reports (unpublished).

(Table 9 continued)

WESTERN UNIT

County	Land area[1/]	Forest land: All forest	Forest land: Non-commercial	Forest land: Commercial	Forest land: Percent commercial forest	Nonforest land with trees: All nonforest with trees	Nonforest land with trees: Wooded strips	Nonforest land with trees: Other nonforest with trees	Nonforest land with trees: Percent nonforest with trees
	Thousand acres				Percent		Thousand acres		Percent
Saline	461.6	3.4	0.3	3.1	0.7	9.0	0.4	8.6	1.9
Scott	459.2	0.1	--	0.1	--	--	--	--	--
Sedgwick	644.7	8.0	1.2	6.8	1.1	19.1	0.7	18.4	3.0
Seward	409.7	2.1	0.1	2.0	0.5	3.1	0.6	2.5	0.8
Sheridan	573.5	1.2	--	1.2	0.2	0.6	0.1	0.5	0.1
Sherman	676.4	--	--	--	--	--	--	--	--
Smith	574.0	3.6	--	3.6	0.6	5.7	3.9	1.8	1.0
Stafford	504.0	3.7	0.2	3.5	0.7	10.1	0.4	9.7	2.0
Stanton	435.6	--	--	--	--	0.9	--	0.9	0.2
Stevens	465.6	0.6	--	0.6	0.1	0.4	0.1	0.3	0.1
Sumner	757.4	15.7	0.5	15.2	2.0	39.6	2.1	37.5	5.2
Thomas	687.7	0.3	--	0.3	--	0.2	--	0.2	--
Trego	569.8	1.8	0.3	1.5	0.3	5.9	0.3	5.6	1.0
Wallace	584.7	0.3	0.2	0.1	--	2.6	0.1	2.5	0.4
Wichita	459.9	--	--	--	--	--	--	--	--
All counties	34,129.8	198.2	15.4	182.8	0.5	387.3	37.1	350.2	1.1
All units	52,338.0	1,358.7	150.8	1,207.9	2.3	1,189.3	150.0	1,039.3	2.3

[1/] U.S. Department of Commerce, Bureau of the Census. 1980. State/county area measurement reports (unpublished).

Table 10.--Area of commercial forest land by ownership class and Forest Survey Unit, Kansas, 1981

(In thousand acres)

Ownership class	All Units	Forest Survey Unit: Northeastern Unit	Forest Survey Unit: Southeastern Unit	Forest Survey Unit: Western Unit
National Forest	--	--	--	--
Miscellaneous federal	36.6	26.2	8.3	2.1
Indian	4.0	4.0	--	--
State	7.5	--	5.0	2.5
County and municipal	2.3	1.2	1.1	--
Farmer	749.5	338.7	284.1	126.7
Miscellaneous private	408.0	218.0	138.5	51.5
All owners	1,207.9	588.1	437.0	182.8

Table 11.--Area of commercial forest land by ownership class and forest type, Kansas, 1981

(In thousand acres)

Ownership class	All types	Forest type: Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
National Forest	--	--	--	--	--	--	--	--	--	--	--
Miscellaneous federal	36.6	1.6	6.8	1.2	2.5	8.6	3.0	--	7.1	5.8	--
Indian	4.0	--	1.2	--	--	1.6	--	--	--	1.2	--
State	7.5	--	2.5	--	--	1.1	2.5	--	--	--	1.4
County and municipal	2.3	--	--	--	1.1	1.2	--	--	--	--	--
Farmer	749.5	18.7	184.4	22.6	26.8	182.2	35.2	1.0	186.6	63.3	28.7
Miscellaneous private	408.0	7.2	121.7	7.1	19.0	94.9	27.4	3.2	72.2	40.0	15.3
All owners	1,207.9	27.5	316.6	30.9	49.4	289.6	68.1	4.2	265.9	110.3	45.4

Table 12.--Area of commercial forest land by ownership class and site class, Kansas, 1981

(In thousand acres)

Ownership class	All classes	Site class (cubic feet of growth/acre/year): 119+	85-119	50-84	20-49
National Forest	--	--	--	--	--
Miscellaneous federal	36.6	--	3.7	16.8	16.1
Indian	4.0	--	--	--	4.0
State	7.5	--	2.2	1.3	4.0
County and municipal	2.3	--	2.3	--	--
Farmer	749.5	0.9	90.0	295.8	362.8
Miscellaneous private	408.0	1.2	60.7	171.6	174.5
All owners	1,207.9	2.1	158.9	485.5	561.4

Table 13.--Area of commercial forest land by ownership class and ownership-size class, Kansas, 1981

(In thousand acres)

Ownership class	All classes	Ownership-size class (acres): 1-5	5-10	10-20	20-50	50-100	100-500	500-2,500	2,500-5,000	5,000+
National Forest	--	--	--	--	--	--	--	--	--	--
Miscellaneous federal	36.6	--	--	--	--	--	--	--	--	36.6
Indian	4.0	--	--	--	--	--	--	--	--	4.0
State	7.5	--	--	--	--	--	--	--	--	7.5
County and municipal	2.3	--	--	--	--	--	--	2.3	--	--
Farmer	749.5	12.6	89.8	171.1	299.4	118.0	56.5	2.1	--	--
Miscellaneous private	408.0	18.4	43.0	101.2	101.9	76.6	38.5	19.8	--	8.6
All owners	1,207.9	31.0	132.8	272.3	401.3	194.6	95.0	24.2	--	56.7

Table 14.--Area of commercial forest land by ownership class, stand-size class, and Forest Survey Unit, Kansas, 1981

(In thousand acres)

Ownership class	All stands	Stand-size class: Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
ALL UNITS					
National Forest	--	--	--	--	--
Miscellaneous federal	36.6	18.1	4.4	14.1	--
Indian	4.0	1.2	--	2.8	--
State	7.5	3.6	2.5	--	1.4
County and municipal	2.3	2.3	--	--	--
Farmer	749.5	357.0	139.7	224.1	28.7
Miscellaneous private	408.0	182.8	87.8	122.1	15.3
All owners	1,207.9	565.0	234.4	363.1	45.4
NORTHEASTERN UNIT					
National Forest	--	--	--	--	--
Miscellaneous federal	26.2	13.4	1.1	11.7	--
Indian	4.0	1.2	--	2.8	--
State	--	--	--	--	--
County and municipal	1.2	1.2	--	--	--
Farmer	338.7	146.3	62.0	116.3	14.1
Miscellaneous private	218.0	80.9	49.2	82.7	5.2
All owners	588.1	243.0	112.3	213.5	19.3
SOUTHEASTERN UNIT					
National Forest	--	--	--	--	--
Miscellaneous federal	8.3	4.7	1.2	2.4	--
Indian	--	--	--	--	--
State	5.0	3.6	--	--	1.4
County and municipal	1.1	1.1	--	--	--
Farmer	284.1	127.0	58.9	94.1	4.1
Miscellaneous private	138.5	56.0	36.5	35.9	10.1
All owners	437.0	192.4	96.6	132.4	15.6
WESTERN UNIT					
National Forest	--	--	--	--	--
Miscellaneous federal	2.1	--	2.1	--	--
Indian	--	--	--	--	--
State	2.5	--	2.5	--	--
County and municipal	--	--	--	--	--
Farmer	126.7	83.7	18.8	13.7	10.5
Miscellaneous private	51.5	45.9	2.1	3.5	--
All owners	182.8	129.6	25.5	17.2	10.5

Table 15.--Area of commercial forest land by ownership class and area-condition class, Kansas, 1981

(In thousand acres)

Ownership class	All classes	Area-condition class			
		70	60	50	40 or better
National Forest	--	--	--	--	--
Miscellaneous federal	36.6	8.9	23.3	4.4	--
Indian	4.0	4.0	--	--	--
State	7.5	1.5	5.0	1.0	--
County and municipal	2.3	--	2.3	--	--
Farmer	749.5	360.9	335.0	53.6	--
Miscellaneous private	408.0	179.2	183.8	45.0	--
All owners	1,207.9	554.5	549.4	104.0	--

Table 16.--Area of commercial forest land by ownership class and stand-volume class, Kansas, 1981

(In thousand acres)

Ownership class	All classes	Stand-volume class (board feet[1] per acre)		
		Less than 1,500	1,500 to 5,000	5,000+
National Forest	--	--	--	--
Miscellaneous federal	36.6	15.8	12.4	8.4
Indian	4.0	2.8	1.2	--
State	7.5	4.0	--	3.5
County and municipal	2.3	--	1.2	1.1
Farmer	749.5	401.6	274.5	73.4
Miscellaneous private	408.0	221.4	139.6	47.0
All owners	1,207.9	645.6	428.9	133.4

[1] International 1/4-inch rule.

Table 17.--Area of commercial forest land by county and forest type, Kansas, 1981

(In thousand acres)

County	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
NORTHEASTERN UNIT											
Atchison	23.8	0.6	9.1	--	1.1	3.7	0.6	0.2	5.6	2.5	0.4
Brown	18.7	0.5	8.2	--	0.8	2.9	0.1	0.1	3.4	2.4	0.3
Clay	15.3	0.2	3.4	0.1	0.8	2.9	0.8	0.2	5.1	1.5	0.3
Dickinson	13.5	0.1	3.8	--	0.6	2.3	0.6	0.2	4.3	1.4	0.2
Doniphan	28.7	1.0	9.7	--	1.5	5.1	0.6	0.4	6.0	3.7	0.7
Douglas	28.1	0.8	10.7	0.2	1.4	4.5	0.1	--	4.4	5.3	0.7
Franklin	25.7	0.7	8.6	0.1	1.3	4.7	0.3	0.1	4.7	4.3	0.9
Geary	18.6	0.6	5.4	--	1.0	3.1	0.8	0.1	4.6	2.5	0.5
Jackson	32.4	0.7	6.5	--	1.1	9.1	0.7	0.3	6.2	5.4	2.4
Jefferson	41.0	0.7	15.0	0.2	2.1	6.6	0.9	--	7.5	6.6	1.4
Johnson	26.0	0.9	8.5	--	1.1	4.7	0.4	0.2	6.4	3.4	0.4
Leavenworth	43.3	0.3	13.5	0.1	2.2	7.2	2.4	0.1	9.4	5.6	2.5
Marshall	29.7	1.2	7.2	0.1	1.2	6.3	0.5	0.6	6.9	4.7	1.0
Miami	46.3	1.5	15.8	--	1.8	8.3	0.6	0.3	10.9	5.9	1.2
Nemaha	16.3	0.4	3.3	--	0.6	4.4	0.4	0.2	3.3	2.7	1.0
Osage	31.2	1.2	9.9	0.1	1.5	5.9	0.9	0.2	7.1	3.8	0.6
Pottawatomie	40.9	1.6	12.7	0.1	1.9	7.7	1.1	0.2	9.1	6.0	0.5
Riley	32.2	1.5	9.9	0.1	1.6	5.5	0.7	0.2	7.3	4.8	0.6
Shawnee	25.6	0.6	7.3	--	1.0	5.3	0.5	0.2	6.1	3.8	0.8
Wabaunsee	29.3	0.6	7.4	0.1	1.4	6.1	1.3	0.2	7.7	3.5	1.0
Washington	14.3	0.1	3.3	--	0.5	3.9	0.3	0.1	2.9	1.5	1.7
Wyandotte	7.2	0.1	3.5	--	0.3	0.7	--	0.1	1.5	0.8	0.2
All counties	588.1	15.9	182.7	1.2	26.8	110.9	14.6	4.2	130.4	82.1	19.3
SOUTHEASTERN UNIT											
Allen	10.0	0.1	1.8	0.2	0.6	2.9	0.2	--	3.3	0.5	0.4
Anderson	15.6	0.6	3.8	0.7	0.8	4.0	0.4	--	3.7	0.9	0.7
Bourbon	35.1	1.2	14.9	3.8	1.3	5.6	--	--	5.6	2.0	0.7
Butler	21.2	0.1	3.1	0.2	1.2	8.1	0.3	--	6.1	1.1	1.0
Chase	9.9	0.1	1.6	0.1	0.5	2.8	0.2	--	3.9	0.3	0.4
Chautauqua	48.5	2.3	14.7	6.5	3.1	11.2	0.3	--	6.2	2.7	1.5
Cherokee	22.0	0.2	5.6	1.9	1.5	6.2	0.2	--	3.7	1.5	1.2
Coffey	10.0	0.1	2.9	0.7	0.7	2.4	0.1	--	1.7	0.7	0.7
Cowley	25.3	0.3	4.8	0.6	1.2	8.7	0.3	--	8.2	0.7	0.5
Crawford	21.8	0.4	5.2	0.7	0.9	6.0	0.5	--	5.9	1.4	0.8
Elk	27.7	1.6	7.8	2.6	1.4	7.2	0.3	--	4.4	1.5	0.9
Greenwood	25.2	0.4	4.4	0.7	1.5	7.2	0.9	--	7.4	1.5	1.2
Labette	16.0	0.2	4.7	1.5	1.1	4.0	0.1	--	2.5	1.1	0.8
Linn	48.7	1.7	19.8	2.3	1.7	7.8	0.4	--	10.5	3.0	1.5
Lyon	11.2	0.1	2.2	0.1	0.6	3.4	0.1	--	4.3	0.2	0.2
Marion	7.4	0.2	1.5	0.3	0.3	2.6	0.1	--	1.9	0.3	0.2
Montgomery	22.9	0.7	8.9	1.2	1.0	3.9	0.1	--	4.8	1.4	0.9
Morris	6.9	0.1	1.6	0.1	0.3	1.9	0.1	--	2.4	0.2	0.2
Neosho	13.8	0.1	3.7	1.3	0.9	3.8	0.1	--	2.3	1.0	0.6
Wilson	25.2	0.9	9.6	3.1	1.1	4.7	--	--	4.0	1.4	0.4
Woodson	12.6	0.2	3.5	1.1	0.9	3.1	0.2	--	1.9	0.9	0.8
All counties	437.0	11.6	126.1	29.7	22.6	107.5	4.9	--	94.7	24.3	15.6

(Table 17 continued on next page)

(Table 17 continued)

WESTERN UNIT

County	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Elm-ash-locust	Non-stocked
Barber	6.6	--	0.2	--	--	2.5	2.1	--	1.4	0.1	0.3
Barton	1.1	--	0.1	--	--	0.4	0.3	--	0.2	--	0.1
Cheyenne	2.7	--	0.1	--	--	0.9	0.9	--	0.6	0.1	0.1
Clark	4.7	--	0.1	--	--	1.8	1.8	--	0.8	--	0.2
Cloud	8.6	--	0.6	--	--	2.5	2.3	--	2.4	0.4	0.4
Comanche	1.0	--	--	--	--	0.5	0.2	--	0.3	--	--
Decatur	2.3	--	0.1	--	--	0.9	0.6	--	0.5	0.1	0.1
Edwards	1.7	--	--	--	--	0.5	0.7	--	0.2	--	0.3
Ellis	2.7	--	0.1	--	--	1.0	0.6	--	0.8	0.1	0.1
Ellsworth	3.1	--	0.2	--	--	0.9	0.8	--	0.9	0.1	0.2
Finney	0.4	--	--	--	--	0.2	0.1	--	0.1	--	--
Ford	0.7	--	--	--	--	0.4	0.1	--	0.2	--	--
Gove	0.1	--	--	--	--	0.1	--	--	--	--	--
Graham	4.7	--	0.2	--	--	1.8	1.3	--	1.1	0.1	0.2
Grant	0.1	--	--	--	--	0.1	--	--	--	--	--
Gray	2.3	--	--	--	--	0.3	1.9	--	0.1	--	--
Greeley	0.1	--	--	--	--	--	0.1	--	--	--	--
Hamilton	3.3	--	--	--	--	1.8	0.7	--	0.5	--	0.3
Harper	4.7	--	0.2	--	--	2.2	1.1	--	1.0	0.1	0.1
Harvey	1.7	--	--	--	--	0.9	0.4	--	0.3	--	0.1
Haskell	--	--	--	--	--	--	--	--	--	--	--
Hodgeman	--	--	--	--	--	--	--	--	--	--	--
Jewell	9.8	--	0.2	--	--	4.4	2.5	--	2.3	0.1	0.3
Kearny	0.5	--	--	--	--	0.2	0.2	--	0.1	--	--
Kingman	7.0	--	0.3	--	--	3.1	1.6	--	1.6	0.2	0.2
Kiowa	0.6	--	--	--	--	0.2	0.1	--	0.1	--	0.2
Lane	0.1	--	--	--	--	0.1	--	--	--	--	--
Lincoln	3.1	--	0.2	--	--	1.0	0.8	--	0.8	0.1	0.2
Logan	1.0	--	--	--	--	0.4	0.2	--	0.2	--	0.2
McPherson	3.8	--	0.2	--	--	0.9	1.3	--	0.9	0.1	0.4
Meade	1.9	--	--	--	--	0.7	0.7	--	0.4	--	0.1
Mitchell	7.0	--	0.4	--	--	2.9	1.3	--	1.9	0.2	0.3
Morton	2.4	--	--	--	--	1.1	0.5	--	0.4	0.1	0.3
Ness	0.4	--	--	--	--	0.1	0.1	--	0.1	0.1	--
Norton	3.0	--	0.1	--	--	1.4	0.7	--	0.6	--	0.2
Osborne	6.3	--	0.4	--	--	2.3	1.6	--	1.5	0.2	0.3
Ottawa	6.7	--	0.4	--	--	2.9	1.2	--	1.7	0.2	0.3
Pawnee	1.9	--	--	--	--	0.8	0.5	--	0.5	--	0.1
Phillips	6.0	--	0.2	--	--	2.4	1.7	--	1.4	0.1	0.2
Pratt	1.6	--	0.1	--	--	0.4	0.6	--	0.3	--	0.2
Rawlins	2.0	--	0.1	--	--	0.7	0.5	--	0.5	0.1	0.1
Reno	6.3	--	0.3	--	--	3.0	1.2	--	1.5	0.1	0.2
Republic	8.2	--	0.2	--	--	3.1	2.5	--	1.6	0.1	0.7
Rice	1.6	--	0.1	--	--	0.3	0.8	--	0.2	--	0.2
Rooks	6.4	--	0.3	--	--	2.6	1.8	--	1.3	0.1	0.3
Rush	0.1	--	--	--	--	0.1	--	--	--	--	--
Russell	4.5	--	0.3	--	--	1.3	1.3	--	1.1	0.1	0.4

(Table 17 continued on next page)

(Table 17 continued)

WESTERN UNIT

County	All types	Forest type: Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Elm-ash-locust	Nonstocked
Saline	3.1	--	0.2	--	--	1.1	0.6	--	1.0	0.1	0.1
Scott	0.1	--	--	--	--	0.1	--	--	--	--	--
Sedgwick	6.8	--	0.5	--	--	3.0	0.9	--	1.9	0.2	0.3
Seward	2.0	--	0.1	--	--	0.7	0.6	--	0.5	--	0.1
Sheridan	1.2	--	0.1	--	--	0.4	0.3	--	0.4	--	--
Sherman	--	--	--	--	--	--	--	--	--	--	--
Smith	3.6	--	0.1	--	--	1.5	0.9	--	0.8	0.1	0.2
Stafford	3.5	--	--	--	--	0.5	1.8	--	0.4	--	0.8
Stanton	--	--	--	--	--	--	--	--	--	--	--
Stevens	0.6	--	--	--	--	0.3	0.1	--	0.2	--	--
Sumner	15.2	--	1.0	--	--	6.6	3.3	--	2.8	0.5	1.0
Thomas	0.3	--	--	--	--	0.1	0.2	--	--	--	--
Trego	1.5	--	0.1	--	--	0.7	0.2	--	0.4	--	0.1
Wallace	0.1	--	--	--	--	0.1	--	--	--	--	--
Wichita	--	--	--	--	--	--	--	--	--	--	--
All counties	182.8	--	7.8	--	--	71.2	48.6	--	40.8	3.9	10.5
All units	1,207.9	27.5	316.6	30.9	49.4	289.6	68.1	4.2	265.9	110.3	45.4

Table 18.--Area of commercial forest land by forest type and stand-age class, Kansas, 1981

(In thousand acres)

Forest type	All classes	Stand-age class (years): 1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Eastern redcedar-hardwood	27.5	12.0	9.0	1.0	1.6	--	2.5	--	--	--	--	--	1.4	--
Oak-hickory	316.6	31.9	41.2	17.2	27.8	28.1	29.5	29.9	29.0	19.5	24.1	24.4	11.7	2.3
Post-blackjack oak	30.9	1.2	1.2	1.2	4.5	11.9	1.3	1.3	3.6	3.5	--	1.2	--	--
Upland plains hardwoods	49.4	5.3	9.7	3.9	6.1	4.9	5.6	7.8	1.2	1.2	--	1.2	2.5	--
Elm-ash-cottonwood	289.6	30.5	62.0	17.5	22.2	14.5	39.2	28.8	28.5	26.9	13.4	6.1	--	--
Cottonwood	68.1	1.2	1.3	2.4	4.2	9.4	6.6	17.1	10.6	2.3	6.7	6.3	--	--
Willow	4.2	1.2	1.2	.8	--	--	1.0	--	--	--	--	--	--	--
Lowland plains hardwoods	265.9	21.6	24.9	13.5	22.6	10.8	36.0	47.8	43.7	14.2	19.9	8.7	1.2	1.0
Upland elm-ash-locust	110.3	36.8	34.9	9.9	10.8	1.2	3.0	2.4	4.9	2.2	2.0	1.0	1.2	--
Nonstocked	45.4	13.1	7.5	7.2	3.8	--	7.0	2.1	3.8	.9	--	--	--	--
All types	1,207.9	154.8	192.9	74.6	103.6	80.8	131.7	137.2	125.3	70.7	66.1	48.9	18.0	3.3

Table 19.--Area of commercial forest land by forest type, stand-size class, and Forest Survey Unit, Kansas, 1981

(In thousand acres)

Forest type	All stands	Stand-size class: Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
ALL UNITS					
Eastern redcedar-hardwood	27.5	2.7	2.8	22.0	--
Oak-hickory	316.6	141.9	84.0	90.7	--
Post-blackjack oak	30.9	8.5	17.6	4.8	--
Upland plains hardwoods	49.4	18.7	16.8	13.9	--
Elm-ash-cottonwood	289.6	145.1	47.0	97.5	--
Cottonwood	68.1	59.6	4.9	3.6	--
Willow	4.2	1.0	0.8	2.4	--
Lowland plains hardwoods	265.9	170.7	46.7	48.5	--
Upland elm-ash-locust	110.3	16.8	13.8	79.7	--
Nonstocked	45.4	--	--	--	45.4
All types	1,207.9	565.0	234.4	363.1	45.4
NORTHEASTERN UNIT					
Eastern redcedar-hardwood	15.9	1.4	1.6	12.9	--
Oak-hickory	182.7	74.5	49.9	58.3	--
Post-blackjack oak	1.2	1.2	--	--	--
Upland plains hardwoods	26.8	13.1	8.6	5.1	--
Elm-ash-cottonwood	110.9	46.4	13.9	50.6	--
Cottonwood	14.6	11.2	1.1	2.3	--
Willow	4.2	1.0	0.8	2.4	--
Lowland plains hardwoods	130.4	78.6	27.2	24.6	--
Upland elm-ash-locust	82.1	15.6	9.2	57.3	--
Nonstocked	19.3	--	--	--	19.3
All types	588.1	243.0	112.3	213.5	19.3
SOUTHEASTERN UNIT					
Eastern redcedar-hardwood	11.6	1.3	1.2	9.1	--
Oak-hickory	126.1	59.6	34.1	32.4	--
Post-blackjack oak	29.7	7.3	17.6	4.8	--
Upland plains hardwoods	22.6	5.6	8.2	8.8	--
Elm-ash-cottonwood	107.5	52.3	17.0	38.2	--
Cottonwood	4.9	2.3	1.3	1.3	--
Willow	--	--	--	--	--
Lowland plains hardwoods	94.7	62.8	14.7	17.2	--
Upland elm-ash-locust	24.3	1.2	2.5	20.6	--
Nonstocked	15.6	--	--	--	15.6
All types	437.0	192.4	96.6	132.4	15.6
WESTERN UNIT					
Eastern redcedar-hardwood	--	--	--	--	--
Oak-hickory	7.8	7.8	--	--	--
Post-blackjack oak	--	--	--	--	--
Upland plains hardwoods	--	--	--	--	--
Elm-ash-cottonwood	71.2	46.4	16.1	8.7	--
Cottonwood	48.6	46.1	2.5	--	--
Willow	--	--	--	--	--
Lowland plains hardwoods	40.8	29.3	4.8	6.7	--
Upland elm-ash-locust	3.9	--	2.1	1.8	--
Nonstocked	10.5	--	--	--	10.5
All types	182.8	129.6	25.5	17.2	10.5

Table 20.--Area of commercial forest land by forest type, stand-size class, and site class, Kansas, 1981

(In thousand acres)

Forest type and stand-size class	All classes	Site class (cubic feet of growth/acre/year) 120+	85-119	50-84	20-49
Eastern redcedar-hardwood					
Sawtimber	2.7	--	--	--	2.7
Poletimber	2.8	--	--	1.2	1.6
Sapling & seedling	22.0	--	--	3.4	18.6
All stands	27.5	--	--	4.6	22.9
Oak-hickory					
Sawtimber	141.9	--	21.2	72.7	48.0
Poletimber	84.0	--	11.7	36.8	35.5
Sapling & seedling	90.7	--	7.4	34.5	48.8
All stands	316.6	--	40.3	144.0	132.3
Post-blackjack oak					
Sawtimber	8.5	--	--	1.2	7.3
Poletimber	17.6	--	--	3.5	14.1
Sapling & seedling	4.8	--	--	--	4.8
All stands	30.9	--	--	4.7	26.2
Upland plains hardwoods					
Sawtimber	18.7	--	3.0	9.3	6.4
Poletimber	16.8	--	4.0	7.2	5.6
Sapling & seedling	13.9	--	1.2	2.3	10.4
All stands	49.4	--	8.2	18.8	22.4
Elm-ash-cottonwood					
Sawtimber	145.1	--	27.6	65.0	52.5
Poletimber	47.0	--	8.9	17.8	20.3
Sapling & seedling	97.5	--	9.9	26.4	61.2
All stands	289.6	--	46.4	109.2	134.0
Cottonwood					
Sawtimber	59.6	--	4.8	21.9	32.9
Poletimber	4.9	--	--	--	4.9
Sapling & seedling	3.6	--	--	--	3.6
All stands	68.1	--	4.8	21.9	41.4
Willow					
Sawtimber	1.0	--	--	1.0	--
Poletimber	0.8	--	--	0.8	--
Sapling & seedling	2.4	--	--	1.2	1.2
All stands	4.2	--	--	3.0	1.2
Lowland plains hardwoods					
Sawtimber	170.7	2.1	35.5	100.7	32.4
Poletimber	46.7	--	8.6	23.3	14.8
Sapling & seedling	48.5	--	10.5	24.9	13.1
All stands	265.9	2.1	54.6	148.9	60.3
Upland elm-ash-locust					
Sawtimber	16.8	--	2.1	3.4	11.3
Poletimber	13.8	--	--	2.3	11.5
Sapling & seedling	79.7	--	--	13.0	66.7
All stands	110.3	--	2.1	18.7	89.5
Nonstocked	45.4	--	2.5	11.7	31.2
All types					
Sawtimber	565.0	2.1	94.2	275.2	193.5
Poletimber	234.4	--	33.2	92.9	108.3
Sapling & seedling	363.1	--	29.0	105.7	228.4
Nonstocked	45.4	--	2.5	11.7	31.2
All stands	1,207.9	2.1	158.9	485.5	561.4

Table 21.--Area of commercial forest land by forest type, stand-size class, and stocking percent, Kansas, 1981

(In thousand acres)

Forest type and stand-size class	All classes	Stocking percent of growing-stock trees				
		Less than 16.7	16.7-60	61-100	101-133	134+
Eastern redcedar-hardwood						
Sawtimber	2.7	--	--	2.7	--	--
Poletimber	2.8	--	1.6	1.2	--	--
Sapling & seedling	22.0	--	14.4	6.4	1.2	--
All stands	27.5	--	16.0	10.3	1.2	--
Oak-hickory						
Sawtimber	141.9	--	48.4	77.2	16.3	--
Poletimber	84.0	--	20.6	49.4	14.0	--
Sapling & seedling	90.7	--	40.1	42.5	8.1	--
All stands	316.6	--	109.1	169.1	38.4	--
Post-blackjack oak						
Sawtimber	8.5	--	2.5	6.0	--	--
Poletimber	17.6	--	2.5	12.8	2.3	--
Sapling & seedling	4.8	--	3.6	--	1.2	--
All stands	30.9	--	8.6	18.8	3.5	--
Upland plains hardwoods						
Sawtimber	18.7	--	11.0	7.7	--	--
Poletimber	16.8	--	11.3	5.5	--	--
Sapling & seedling	13.9	--	6.5	7.4	--	--
All stands	49.4	--	28.8	20.6	--	--
Elm-ash-cottonwood						
Sawtimber	145.1	--	62.8	67.4	14.9	--
Poletimber	47.0	--	26.2	20.8	--	--
Sapling & seedling	97.5	--	59.9	35.1	2.5	--
All stands	289.6	--	148.9	123.3	17.4	--
Cottonwood						
Sawtimber	59.6	--	19.4	23.9	16.3	--
Poletimber	4.9	--	1.3	3.6	--	--
Sapling & seedling	3.6	--	1.3	1.2	1.1	--
All stands	68.1	--	22.0	28.7	17.4	--
Willow						
Sawtimber	1.0	--	1.0	--	--	--
Poletimber	0.8	--	0.8	--	--	--
Sapling & seedling	2.4	--	1.2	--	1.2	--
All stands	4.2	--	3.0	--	1.2	--
Lowland plains hardwoods						
Sawtimber	170.7	--	64.9	92.3	13.5	--
Poletimber	46.7	--	21.7	25.0	--	--
Sapling & seedling	48.5	--	27.0	21.5	--	--
All stands	265.9	--	113.6	138.8	13.5	--
Upland elm-ash-locust						
Sawtimber	16.8	--	11.3	4.5	1.0	--
Poletimber	13.8	--	9.1	4.7	--	--
Sapling & seedling	79.7	--	52.9	25.4	1.4	--
All stands	110.3	--	73.3	34.6	2.4	--
Nonstocked	45.4	45.4	--	--	--	--
All types						
Sawtimber	565.0	--	221.3	281.7	62.0	--
Poletimber	234.4	--	95.1	123.0	16.3	--
Sapling & seedling	363.1	--	206.9	139.5	16.7	--
Nonstocked	45.4	45.4	--	--	--	--
All stands	1,207.9	45.4	523.3	544.2	95.0	--

Table 22.--Area of commercial forest land by forest type, site-index class, and Forest Survey Unit, Kansas, 1981

(In thousand acres)

Forest type	All classes	Site-index class (feet) 21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
ALL UNITS									
Eastern redcedar-hardwood	27.5	1.9	10.0	6.0	4.9	4.7	--	--	--
Oak-hickory	316.6	--	20.4	58.6	109.4	63.1	45.5	12.9	6.7
Post-blackjack oak	30.9	--	8.3	11.9	8.3	1.2	1.2	--	--
Upland plains hardwoods	49.4	--	1.2	2.2	19.0	11.6	8.4	5.8	1.2
Elm-ash-cottonwood	289.6	--	3.5	22.1	60.4	90.2	67.1	36.4	9.9
Cottonwood	68.1	--	--	9.3	13.8	25.0	15.1	3.7	1.2
Willow	4.2	--	--	1.2	--	1.0	2.0	--	--
Lowland plains hardwoods	265.9	--	7.6	12.4	40.4	94.8	70.8	35.7	4.2
Upland elm-ash-locust	110.3	--	8.2	28.9	37.5	20.7	12.9	2.1	--
Nonstocked	45.4	--	3.9	11.3	9.8	14.3	3.6	2.5	--
All types	1,207.9	1.9	63.1	163.9	303.5	326.6	226.6	99.1	23.2
NORTHEASTERN UNIT									
Eastern redcedar-hardwood	15.9	1.9	7.2	3.1	2.7	1.0	--	--	--
Oak-hickory	182.7	--	7.0	41.2	63.0	30.8	29.0	7.9	3.8
Post-blackjack oak	1.2	--	1.2	--	--	--	--	--	--
Upland plains hardwoods	26.8	--	--	0.6	14.1	4.6	5.0	2.5	--
Elm-ash-cottonwood	110.9	--	3.5	18.4	23.5	18.4	28.7	15.6	2.8
Cottonwood	14.6	--	--	1.2	2.2	3.9	2.4	3.7	1.2
Willow	4.2	--	--	1.2	--	1.0	2.0	--	--
Lowland plains hardwoods	130.4	--	4.1	5.8	23.2	39.3	39.0	17.0	2.0
Upland elm-ash-locust	82.1	--	7.0	26.0	23.2	13.4	10.4	2.1	--
Nonstocked	19.3	--	2.4	8.8	2.0	4.6	1.5	--	--
All types	588.1	1.9	32.4	106.3	153.9	117.0	118.0	48.8	9.8
SOUTHEASTERN UNIT									
Eastern redcedar-hardwood	11.6	--	2.8	2.9	2.2	3.7	--	--	--
Oak-hickory	126.1	--	13.4	17.4	42.5	28.4	16.5	5.0	2.9
Post-blackjack oak	29.7	--	7.1	11.9	8.3	1.2	1.2	--	--
Upland plains hardwoods	22.6	--	1.2	1.6	4.9	7.0	3.4	3.3	1.2
Elm-ash-cottonwood	107.5	--	--	3.7	19.4	40.3	21.5	15.5	7.1
Cottonwood	4.9	--	--	1.3	--	2.6	1.0	--	--
Willow	--	--	--	--	--	--	--	--	--
Lowland plains hardwoods	94.7	--	--	3.9	10.7	43.1	21.4	13.4	2.2
Upland elm-ash-locust	24.3	--	1.2	2.9	10.4	7.3	2.5	--	--
Nonstocked	15.6	--	1.5	2.5	4.1	5.0	--	2.5	--
All types	437.0	--	27.2	48.1	102.5	138.6	67.5	39.7	13.4
WESTERN UNIT									
Eastern redcedar-hardwood	--	--	--	--	--	--	--	--	--
Oak-hickory	7.8	--	--	--	3.9	3.9	--	--	--
Post-blackjack oak	--	--	--	--	--	--	--	--	--
Upland plains hardwoods	--	--	--	--	--	--	--	--	--
Elm-ash-cottonwood	71.2	--	--	--	17.5	31.5	16.9	5.3	--
Cottonwood	48.6	--	--	6.8	11.6	18.5	11.7	--	--
Willow	--	--	--	--	--	--	--	--	--
Lowland plains hardwoods	40.8	--	3.5	2.7	6.5	12.4	10.4	5.3	--
Upland elm-ash-locust	3.9	--	--	--	3.9	--	--	--	--
Nonstocked	10.5	--	--	--	3.7	4.7	2.1	--	--
All types	182.8	--	3.5	9.5	47.1	71.0	41.1	10.6	--

Table 23.--Area of commercial forest land by forest type and basal-area class, Kansas, 1981

(In thousand acres)

Forest type	All classes	Basal-area class (square feet per acre)									
		0-20	21-40	41-60	61-80	81-100	101-120	121-140	141-160	161-180	181+
Eastern redcedar-hardwood	27.5	6.5	8.1	7.5	2.8	--	2.6	--	--	--	--
Oak-hickory	316.6	13.9	42.4	83.5	78.3	60.6	30.6	4.6	2.7	--	--
Post-blackjack oak	30.9	--	2.4	3.7	10.8	9.3	3.6	1.1	--	--	--
Upland plains hardwoods	49.4	--	6.4	16.2	12.0	11.2	2.5	1.1	--	--	--
Elm-ash-cottonwood	289.6	11.5	49.7	88.9	56.8	31.0	34.3	8.5	3.0	5.9	--
Cottonwood	68.1	1.8	4.7	16.6	10.0	10.0	9.2	5.7	6.0	--	4.1
Willow	4.2	1.2	0.8	1.2	--	--	1.0	--	--	--	--
Lowland plains hardwoods	265.9	3.5	36.6	63.3	65.1	47.3	40.5	9.6	--	--	--
Upland elm-ash-locust	110.3	27.6	29.3	24.2	19.6	8.4	1.2	--	--	--	--
Nonstocked	45.4	19.9	9.8	14.7	1.0	--	--	--	--	--	--
All types	1,207.9	85.9	190.2	319.8	256.4	177.8	125.5	30.6	11.7	5.9	4.1

Table 24.--Area of commercial forest land by forest type and distance to road[1/], Kansas, 1981

(In thousand acres)

Forest type	All distances	Distance to road (miles)							
		0-1/8	1/8-1/4	1/4-1	1-2 1/2	2 1/2-5	5-10	10-20	20+
Eastern redcedar-hardwood	27.5	2.8	7.4	15.7	1.6	--	--	--	--
Oak-hickory	316.6	60.0	81.3	169.5	2.5	3.3	--	--	--
Post-blackjack oak	30.9	4.8	8.5	15.2	--	2.4	--	--	--
Upland plains hardwoods	49.4	15.8	11.4	17.8	--	4.4	--	--	--
Elm-ash-cottonwood	289.6	62.2	90.5	124.8	2.3	3.5	--	6.3	--
Cottonwood	68.1	7.1	24.6	33.0	3.4	--	--	--	--
Willow	4.2	--	3.0	1.2	--	--	--	--	--
Lowland plains hardwoods	265.9	50.4	90.0	117.5	7.0	--	--	1.0	--
Upland elm-ash-locust	110.3	28.2	34.0	42.1	2.5	2.5	--	1.0	--
Nonstocked	45.4	8.9	13.1	23.4	--	--	--	--	--
All types	1,207.9	240.2	363.8	560.2	19.3	16.1	--	8.3	--

[1/] A permanent road that is maintained at least once a year.

Table 25.--Area of commercial forest land by forest type and distance to water[1/], Kansas, 1981

(In thousand acres)

Forest type	All distances	Distance to water (miles)							
		0-1/8	1/8-1/4	1/4-1	1-2 1/2	2 1/2-5	5-10	10-20	20+
Eastern redcedar-hardwood	27.5	2.8	2.5	4.9	7.8	1.4	--	--	8.1
Oak-hickory	316.6	28.5	20.5	74.4	74.0	41.6	20.2	22.3	35.1
Post-blackjack oak	30.9	1.2	4.6	4.7	8.4	4.7	2.4	3.7	1.2
Upland plains hardwoods	49.4	2.3	3.6	6.1	6.0	9.6	8.8	6.5	6.5
Elm-ash-cottonwood	289.6	56.2	20.1	35.9	42.8	27.1	31.2	28.5	47.8
Cottonwood	68.1	19.1	8.0	9.6	3.6	2.9	5.3	6.9	12.7
Willow	4.2	1.0	--	1.2	0.8	1.2	--	--	--
Lowland plains hardwoods	265.9	44.9	11.9	36.3	37.2	47.4	31.2	31.1	25.9
Upland elm-ash-locust	110.3	9.9	8.6	22.1	26.6	23.6	4.4	3.6	11.5
Nonstocked	45.4	3.5	1.2	6.0	4.4	8.1	3.1	8.9	10.2
All types	1,207.9	169.4	81.0	201.2	211.6	167.6	106.6	111.5	159.0

[1/]Lakes or ponds 5 acres or larger in area, and streams or rivers at least 66 feet in width.

Table 26.--Area of commercial forest land by forest type and stand-area class, Kansas, 1981

(In thousand acres)

Forest type	All classes	Stand-area class (acres)								
		1-4	5-9	10-19	20-39	40-79	80-159	160-319	320-639	640+
Eastern redcedar-hardwood	27.5	3.5	10.2	5.8	3.6	--	4.4	--	--	--
Oak-hickory	316.6	33.1	67.7	94.7	43.6	40.8	17.2	8.3	9.3	1.9
Post-blackjack oak	30.9	1.2	4.9	7.0	7.2	3.7	3.5	3.4	--	--
Upland plains hardwoods	49.4	6.8	7.3	21.2	10.2	2.7	0	1.2	--	--
Elm-ash-cottonwood	289.6	74.1	83.6	66.7	34.9	13.7	8.7	5.5	1.1	1.3
Cottonwood	68.1	24.5	10.6	11.2	12.2	3.3	1.1	3.9	--	1.3
Willow	4.2	0.8	1.2	1.2	1.0	--	--	--	--	--
Lowland plains hardwoods	265.9	57.4	72.7	74.5	33.0	17.7	10.6	--	--	--
Upland elm-ash-locust	110.3	27.6	30.5	19.8	16.8	9.6	6.0	--	--	--
Nonstocked	45.4	14.8	15.5	7.6	--	1.2	1.2	5.1	--	--
All types	1,207.9	243.8	304.2	309.7	162.5	92.7	52.7	27.4	10.4	4.5

Table 27.--Area of commercial forest land by stocking class based on selected stand components, Kansas, 1981

(In thousand acres)

Stocking percentage	All live trees	Stocking classified in terms of			
		Growing-stock trees	Desirable trees	Acceptable trees	Rough and rotten trees
0-10	2.7	19.5	1,163.2	19.5	175.3
11-20	2.5	43.9	36.2	46.1	271.3
21-30	12.4	71.8	5.0	79.9	281.0
31-40	22.1	143.6	2.2	148.4	217.7
41-50	51.5	134.9	--	144.3	133.5
51-60	81.8	155.1	1.3	155.6	61.8
61-70	95.6	166.7	--	176.1	43.7
71-80	119.0	156.0	--	150.2	20.3
81-90	176.5	129.9	--	124.2	2.1
91-100	187.4	91.5	--	87.5	1.2
101-110	154.8	52.5	--	38.6	--
111-120	149.3	25.8	--	23.1	--
121-130	82.4	16.7	--	14.4	--
131-140	48.6	--	--	--	--
141-150	19.5	--	--	--	--
151-160	1.8	--	--	--	--
161+	--	--	--	--	--
Total	1,207.9	1,207.9	1,207.9	1,207.9	1,207.9

Table 28.--Area of commercial forest land by forest type, physiographic class, and ownership class, Kansas, 1981

(In thousand acres)

Forest type and physiographic class	All classes	Ownership class						
		National Forest	Misc. federal	Indian	State	County and municipal	Farmer	Misc. private
Eastern redcedar-hardwood								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	--	--	--	--	--	--	--	--
Mesic	2.4	--	--	--	--	--	2.4	--
Xeromesic	25.1	--	1.6	--	--	--	16.3	7.2
Xeric	--	--	--	--	--	--	--	--
All classes	27.5	--	1.6	--	--	--	18.7	7.2
Oak-hickory								
Hydric	2.6	--	--	--	--	--	2.6	--
Hydromesic	7.6	--	--	--	--	--	4.2	3.4
Mesic	132.7	--	0.9	1.2	2.6	--	76.7	51.3
Xeromesic	155.5	--	5.9	--	--	--	88.5	61.1
Xeric	18.2	--	--	--	--	--	12.4	5.8
All classes	316.6	--	6.8	1.2	2.6	--	184.4	121.6
Post-blackjack oak								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	1.2	--	--	--	--	--	1.2	--
Mesic	9.8	--	--	--	--	--	8.5	1.3
Xeromesic	17.6	--	1.2	--	--	--	11.7	4.7
Xeric	2.3	--	--	--	--	--	1.1	1.2
All classes	30.9	--	1.2	--	--	--	22.5	7.2
Upland plains hardwoods								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	--	--	--	--	--	--	--	--
Mesic	1.2	--	--	--	--	--	1.2	--
Xeromesic	46.5	--	2.5	--	--	1.1	23.9	19.0
Xeric	1.7	--	--	--	--	--	1.7	--
All classes	49.4	--	2.5	--	--	1.1	26.8	19.0
Elm-ash-cottonwood								
Hydric	9.0	--	--	--	--	--	2.3	6.7
Hydromesic	77.1	--	3.3	--	1.0	--	49.6	23.2
Mesic	203.5	--	5.3	1.6	--	1.2	130.3	65.1
Xeromesic	--	--	--	--	--	--	--	--
Xeric	--	--	--	--	--	--	--	--
All classes	289.6	--	8.6	1.6	1.0	1.2	182.2	95.0
Cottonwood								
Hydric	3.9	--	--	--	--	--	--	3.9
Hydromesic	20.2	--	3.0	--	2.5	--	6.9	7.8
Mesic	29.9	--	--	--	--	--	16.3	13.6
Xeromesic	6.9	--	--	--	--	--	4.8	2.1
Xeric	7.2	--	--	--	--	--	7.2	--
All classes	68.1	--	3.0	--	2.5	--	35.2	27.4

(Table 28 continued on next page)

(Table 28 continued)

Forest type and physiographic class	All classes	Ownership class						
		National Forest	Misc. federal	Indian	State	County and municipal	Farmer	Misc. private
Willow								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	3.4	--	--	--	--	--	1.0	2.4
Mesic	--	--	--	--	--	--	--	--
Xeromesic	0.8	--	--	--	--	--	--	0.8
Xeric	--	--	--	--	--	--	--	--
All classes	4.2	--	--	--	--	--	1.0	3.2
Lowland plains hardwoods								
Hydric	2.5	--	--	--	--	--	2.5	--
Hydromesic	52.3	--	2.7	--	--	--	31.6	18.0
Mesic	211.1	--	4.4	--	--	--	152.5	54.2
Xeromesic	--	--	--	--	--	--	--	--
Xeric	--	--	--	--	--	--	--	--
All classes	265.9	--	7.1	--	--	--	186.6	72.2
Upland elm-ash-locust								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	--	--	--	--	--	--	--	--
Mesic	--	--	--	--	--	--	--	--
Xeromesic	100.5	--	5.8	1.2	--	--	54.7	38.8
Xeric	9.8	--	--	--	--	--	8.8	1.0
All classes	110.3	--	5.8	1.2	--	--	63.5	39.8
Nonstocked								
Hydric	9.1	--	--	--	1.4	--	--	7.7
Hydromesic	3.0	--	--	--	--	--	3.0	--
Mesic	11.5	--	--	--	--	--	7.7	3.8
Xeromesic	19.7	--	--	--	--	--	15.8	3.9
Xeric	2.1	--	--	--	--	--	2.1	--
All classes	45.4	--	--	--	1.4	--	28.6	15.4
All types								
Hydric	27.1	--	--	--	1.4	--	7.4	18.3
Hydromesic	164.8	--	9.0	--	3.5	--	97.5	54.8
Mesic	602.1	--	10.6	2.8	2.6	1.2	395.6	189.3
Xeromesic	372.6	--	17.0	1.2	--	1.1	215.7	137.6
Xeric	41.3	--	--	--	--	--	33.3	8.0
All classes	1,207.9	--	36.6	4.0	7.5	2.3	749.5	408.0

Table 29.--Area of noncommercial forest land by ownership class, Kansas, 1981

(In thousand acres)

Ownership class	Total	Unproductive	Productive-reserved
National Forest	--	--	--
Miscellaneous federal	13.8	--	13.8
Indian	--	--	--
State	2.8	--	2.8
County and municipal	4.8	--	4.8
Farmer	89.1	89.1	--
Miscellaneous private	40.3	39.3	1.0
All owners	150.8	128.4	22.4

Table 30.--Area of noncommercial forest land by forest type and Forest Survey Unit, Kansas, 1981

(In thousand acres)

Forest type	Total	Unproductive	Productive-reserved
ALL UNITS			
Eastern redcedar-hardwood	24.6	17.1	7.5
Oak-hickory	23.1	13.2	9.9
Post-blackjack oak	76.0	76.0	--
Upland plains hardwoods	8.8	8.8	--
Elm-ash-cottonwood	7.8	5.3	2.5
Cottonwood	2.5	--	2.5
Willow	--	--	--
Lowland plains hardwoods	1.0	1.0	--
Upland elm-ash-locust	6.0	6.0	--
Nonstocked	1.0	1.0	--
All types	150.8	128.4	22.4
NORTHEASTERN UNIT			
Eastern redcedar-hardwood	19.0	11.5	7.5
Oak-hickory	7.6	--	7.6
Post-blackjack oak	2.4	2.4	--
Upland plains hardwoods	2.3	2.3	--
Elm-ash-cottonwood	--	--	--
Cottonwood	--	--	--
Willow	--	--	--
Lowland plains hardwoods	--	--	--
Upland elm-ash-locust	3.8	3.8	--
Nonstocked	1.0	1.0	--
All types	36.1	21.0	15.1
SOUTHEASTERN UNIT			
Eastern redcedar-hardwood	2.4	2.4	--
Oak-hickory	12.0	9.7	2.3
Post-blackjack oak	73.6	73.6	--
Upland plains hardwoods	6.5	6.5	--
Elm-ash-cottonwood	1.6	1.6	--
Cottonwood	--	--	--
Willow	--	--	--
Lowland plains hardwoods	1.0	1.0	--
Upland elm-ash-locust	2.2	2.2	--
Nonstocked	--	--	--
All types	99.3	97.0	2.3
WESTERN UNIT			
Eastern redcedar-hardwood	3.2	3.2	--
Oak-hickory	3.5	3.5	--
Post-blackjack oak	--	--	--
Upland plains hardwoods	--	--	--
Elm-ash-cottonwood	6.2	3.7	2.5
Cottonwood	2.5	--	2.5
Willow	--	--	--
Lowland plains hardwoods	--	--	--
Upland elm-ash-locust	--	--	--
Nonstocked	--	--	--
All types	15.4	10.4	5.0

Table 31.--Area of nonforest land with trees by land use, forest type, and Forest Survey Unit, Kansas, 1981

(In thousand acres)

Land use	All types	Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
					ALL UNITS						
		Forest type									
Cropland	63.0	--	4.1	2.7	1.3	27.4	1.6	--	10.0	7.3	8.6
Improved pasture	533.6	26.4	24.4	11.7	11.7	122.4	13.5	--	15.1	190.0	118.4
Wooded strips	150.0	5.3	4.8	--	6.4	51.6	5.1	2.0	49.9	5.6	19.3
Idle farmland	23.9	--	--	--	--	18.0	--	--	1.3	1.4	3.2
Marsh	22.7	--	--	--	--	8.6	1.1	1.4	0.9	--	10.7
Windbreaks	186.3	9.8	1.4	--	4.3	48.9	3.2	--	1.4	117.3	--
Wooded pasture	209.8	13.3	12.7	--	11.1	55.4	8.9	--	10.0	14.5	83.9
All uses	1,189.3	54.8	47.4	14.4	34.8	332.3	33.4	3.4	88.6	336.1	244.1
					NORTHEASTERN UNIT						
Cropland	30.2	--	4.1	--	--	6.2	1.6	--	7.0	5.9	5.4
Improved pasture	139.4	9.9	14.8	--	5.4	29.4	--	--	3.8	51.7	24.4
Wooded strips	62.6	1.9	1.2	--	3.9	22.3	--	1.0	21.4	2.9	8.0
Idle farmland	4.1	--	--	--	--	2.7	--	--	--	1.4	--
Marsh	4.2	--	--	--	--	0.8	1.1	1.4	0.9	--	--
Windbreaks	43.0	2.9	1.4	--	3.0	6.1	--	--	1.4	28.2	--
Wooded pasture	60.5	3.4	6.3	--	2.3	13.8	--	--	3.0	4.5	27.2
All uses	344.0	18.1	27.8	--	14.6	81.3	2.7	2.4	37.5	94.6	65.0
					SOUTHEASTERN UNIT						
Cropland	13.6	--	--	2.7	1.3	5.2	--	--	3.0	1.4	--
Improved pasture	225.2	7.3	9.6	11.7	6.3	37.3	1.4	--	8.1	112.1	31.4
Wooded strips	50.3	--	3.6	--	2.5	13.6	--	1.0	18.9	2.7	8.0
Idle farmland	2.5	--	--	--	--	1.2	--	--	1.3	--	--
Marsh	4.3	--	--	--	--	4.3	--	--	--	--	--
Windbreaks	66.9	--	--	--	1.3	5.9	--	--	--	59.7	--
Wooded pasture	95.2	6.7	6.4	--	6.2	20.1	--	--	7.0	10.0	38.8
All uses	458.0	14.0	19.6	14.4	17.6	87.6	1.4	1.0	38.3	185.9	78.2
					WESTERN UNIT						
Cropland	19.2	--	--	--	--	16.0	--	--	--	--	3.2
Improved pasture	169.0	9.2	--	--	--	55.7	12.1	--	3.2	26.2	62.6
Wooded strips	37.1	3.4	--	--	--	15.7	5.1	--	9.6	--	3.3
Idle farmland	17.3	--	--	--	--	14.1	--	--	--	--	3.2
Marsh	14.2	--	--	--	--	3.5	--	--	--	--	10.7
Windbreaks	76.4	6.9	--	--	--	36.9	3.2	--	--	29.4	--
Wooded pasture	54.1	3.2	--	--	2.6	21.5	8.9	--	--	--	17.9
All uses	387.3	22.7	--	--	2.6	163.4	29.3	--	12.8	55.6	100.9

Table 32.--Area of nonforest land with trees by forest type and stand-size class, Kansas, 1981

(In thousand acres)

Forest type	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Eastern redcedar-hardwood	54.8	--	16.8	38.0	--
Oak-hickory	47.4	14.5	14.7	18.2	--
Post-blackjack oak	14.4	1.3	6.2	6.9	--
Upland plains hardwoods	34.8	8.8	11.0	15.0	--
Elm-ash-cottonwood	332.3	51.8	144.3	136.2	--
Cottonwood	33.4	23.8	9.6	--	--
Willow	3.4	--	2.4	1.0	--
Lowland plains hardwoods	88.6	18.7	40.4	29.5	--
Upland elm-ash-locust	336.1	24.6	157.4	154.1	--
Nonstocked	244.1	--	--	--	244.1
All types	1,189.3	143.5	402.8	398.9	244.1

Table 33.--Area of windbreaks by forest type, stand-size class, and Forest Survey Unit, Kansas, 1981

(In thousand acres)

Forest type	All stands	Stand-size class: Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
ALL UNITS					
Eastern redcedar-hardwood	9.8	--	6.9	2.9	--
Oak-hickory	1.4	--	1.4	--	--
Post-blackjack oak	--	--	--	--	--
Upland plains hardwoods	4.3	1.6	2.7	--	--
Elm-ash-cottonwood	48.8	3.3	39.1	6.4	--
Cottonwood	3.2	--	3.2	--	--
Willow	--	--	--	--	--
Lowland plains hardwoods	1.4	--	1.4	--	--
Upland elm-ash-locust	117.4	11.4	87.0	19.0	--
Nonstocked	--	--	--	--	--
All types	186.3	16.3	141.7	28.3	--
NORTHEASTERN UNIT					
Eastern redcedar-hardwood	2.9	--	--	2.9	--
Oak-hickory	1.4	--	1.4	--	--
Post-blackjack oak	--	--	--	--	--
Upland plains hardwoods	3.0	1.6	1.4	--	--
Elm-ash-cottonwood	6.0	--	4.5	1.5	--
Cottonwood	--	--	--	--	--
Willow	--	--	--	--	--
Lowland plains hardwoods	1.4	--	1.4	--	--
Upland elm-ash-locust	28.3	2.8	19.8	5.7	--
Nonstocked	--	--	--	--	--
All types	43.0	4.4	28.5	10.1	--
SOUTHEASTERN UNIT					
Eastern redcedar-hardwood	--	--	--	--	--
Oak-hickory	--	--	--	--	--
Post-blackjack oak	--	--	--	--	--
Upland plains hardwoods	1.3	--	1.3	--	--
Elm-ash-cottonwood	5.9	--	4.2	1.7	--
Cottonwood	--	--	--	--	--
Willow	--	--	--	--	--
Lowland plains hardwoods	--	--	--	--	--
Upland elm-ash-locust	59.7	1.3	48.3	10.1	--
Nonstocked	--	--	--	--	--
All types	66.9	1.3	53.8	11.8	--
WESTERN UNIT					
Eastern redcedar-hardwood	6.9	--	6.9	--	--
Oak-hickory	--	--	--	--	--
Post-blackjack oak	--	--	--	--	--
Upland plains hardwoods	--	--	--	--	--
Elm-ash-cottonwood	36.9	3.3	30.4	3.2	--
Cottonwood	3.2	--	3.2	--	--
Willow	--	--	--	--	--
Lowland plains hardwoods	--	--	--	--	--
Upland elm-ash-locust	29.4	7.3	18.9	3.2	--
Nonstocked	--	--	--	--	--
All types	76.4	10.6	59.4	6.4	--

Table 34.--Area of wooded strips by forest type, stand-size class, and ownership class, Kansas, 1981

(In thousand acres)

Forest type and stand-size class	All classes	Ownership class						
		National Forest	Misc. federal	Indian	State	County and municipal	Farmer	Misc. private
Eastern redcedar-hardwood								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	3.4	--	--	--	--	--	3.4	--
Sapling & seedling	1.9	--	--	--	--	--	1.9	--
All stands	5.3	--	--	--	--	--	5.3	--
Oak-hickory								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	2.4	--	--	--	--	--	2.4	--
Sapling & seedling	2.7	--	--	--	--	--	2.7	--
All stands	5.1	--	--	--	--	--	5.1	--
Post-blackjack oak								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Upland plains hardwoods								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	2.8	--	--	--	--	--	2.8	--
Sapling & seedling	3.6	--	--	--	--	--	2.0	1.6
All stands	6.4	--	--	--	--	--	4.8	1.6
Elm-ash-cottonwood								
Sawtimber	4.6	--	1.3	--	--	--	3.3	--
Poletimber	24.1	--	3.3	--	--	--	17.8	3.0
Sapling & seedling	23.1	--	--	--	--	--	17.4	5.7
All stands	51.8	--	4.6	--	--	--	38.5	8.7
Cottonwood								
Sawtimber	2.5	--	--	--	--	--	2.5	--
Poletimber	2.6	--	--	--	--	--	--	2.6
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	5.1	--	--	--	--	--	2.5	2.6
Willow								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	1.0	--	--	--	--	--	1.0	--
Sapling & seedling	1.0	--	--	--	--	--	1.0	--
All stands	2.0	--	--	--	--	--	2.0	--
Lowland plains hardwoods								
Sawtimber	6.8	--	--	--	--	--	3.7	3.1
Poletimber	13.5	--	--	--	--	--	12.1	1.4
Sapling & seedling	14.9	--	--	--	--	--	13.9	1.0
All stands	35.2	--	--	--	--	--	29.7	5.5
Upland elm-ash-locust								
Sawtimber	1.4	--	--	--	--	--	--	1.4
Poletimber	8.1	--	--	--	--	--	6.6	1.5
Sapling & seedling	10.4	--	1.2	--	--	--	4.0	5.2
All stands	19.9	--	1.2	--	--	--	10.6	8.1
Nonstocked	19.2	--	--	--	--	--	16.1	3.1
All types								
Sawtimber	15.3	--	1.3	--	--	--	9.5	4.5
Poletimber	57.9	--	3.3	--	--	--	46.1	8.5
Sapling & seedling	57.6	--	1.2	--	--	--	42.9	13.5
Nonstocked	19.2	--	--	--	--	--	16.1	3.1
All stands	150.0	--	5.8	--	--	--	114.6	29.6

Table 35.--Area of wooded strips by forest type and site-index class, Kansas, 1981

(In thousand acres)

Forest type	All classes	Site-index class (feet)							
		21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
Eastern redcedar-hardwood	5.3	--	--	1.9	3.4	--	--	--	--
Oak-hickory	5.1	--	--	2.4	--	2.7	--	--	--
Post-blackjack oak	--	--	--	--	--	--	--	--	--
Upland plains hardwoods	6.4	--	--	5.5	--	--	0.9	--	--
Elm-ash-cottonwood	51.8	--	1.2	19.2	9.9	15.3	1.5	4.7	--
Cottonwood	5.1	--	--	2.5	2.6	--	--	--	--
Willow	2.0	--	--	1.0	--	--	--	1.0	--
Lowland plains hardwoods	35.2	--	--	20.5	4.7	7.2	1.4	1.4	--
Upland elm-ash-locust	19.9	--	--	9.6	6.6	3.7	--	--	--
Nonstocked	19.2	--	--	10.4	4.7	3.1	1.0	--	--
All types	150.0	--	1.2	73.0	31.9	32.0	4.8	7.1	--

Table 36.--Area of wooded strips by forest type, basal-area class, and Forest Survey Unit, Kansas, 1981

(In thousand acres)

Forest type	All classes	Basal-area class (square feet per acre) 0-20	21-40	41-60	61-80	81-100	101-120	121-140	141-160	161-180	181+
ALL UNITS											
Eastern redcedar-hardwood	5.3	--	1.9	--	--	--	--	--	--	--	3.4
Oak-hickory	5.1	1.2	1.5	--	1.2	--	--	--	--	1.2	--
Post-blackjack oak	--	--	--	--	--	--	--	--	--	--	--
Upland plains hardwoods	6.4	--	1.4	1.6	0.9	1.4	--	1.1	--	--	--
Elm-ash-cottonwood	51.8	1.4	10.1	5.5	12.5	3.6	4.0	8.6	4.2	1.0	0.9
Cottonwood	5.1	--	--	--	--	2.5	--	--	--	--	2.6
Willow	2.0	--	--	--	--	--	1.0	--	--	1.0	--
Lowland plains hardwoods	35.2	3.0	6.1	2.5	8.8	4.0	6.5	1.4	--	2.9	--
Upland elm-ash-locust	19.9	--	3.9	5.2	5.5	2.4	--	1.4	--	--	1.5
Nonstocked	19.2	3.8	5.5	--	5.5	1.4	1.4	1.6	--	--	--
All types	150.0	9.4	30.4	14.8	34.4	15.3	12.9	14.1	4.2	6.1	8.4
NORTHEASTERN UNIT											
Eastern redcedar-hardwood	1.9	--	1.9	--	--	--	--	--	--	--	--
Oak-hickory	2.4	1.2	--	--	1.2	--	--	--	--	--	--
Post-blackjack oak	--	--	--	--	--	--	--	--	--	--	--
Upland plains hardwoods	3.9	--	--	1.6	0.9	1.4	--	--	--	--	--
Elm-ash-cottonwood	18.0	1.4	1.4	4.1	5.6	--	2.7	1.0	0.9	--	0.9
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	1.0	--	--	--	--	--	1.0	--	--	--	--
Lowland plains hardwoods	16.4	0.9	1.2	1.2	4.7	1.6	3.9	--	--	2.9	--
Upland elm-ash-locust	11.1	--	1.4	2.7	4.1	--	--	1.4	--	--	1.5
Nonstocked	7.9	2.4	1.4	--	1.1	1.4	--	1.6	--	--	--
All types	62.6	5.9	7.3	9.6	17.6	4.4	7.6	4.0	0.9	2.9	2.4
SOUTHEASTERN UNIT											
Eastern redcedar-hardwood	--	--	--	--	--	--	--	--	--	--	--
Oak-hickory	2.7	--	1.5	--	--	--	--	--	--	1.2	--
Post-blackjack oak	--	--	--	--	--	--	--	--	--	--	--
Upland plains hardwoods	2.5	--	1.4	--	--	--	--	1.1	--	--	--
Elm-ash-cottonwood	16.1	--	5.5	1.4	3.5	3.6	--	1.1	--	1.0	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	1.0	--	--	--	--	--	--	--	--	1.0	--
Lowland plains hardwoods	13.7	2.1	2.4	1.3	4.1	2.4	--	1.4	--	--	--
Upland elm-ash-locust	6.3	--	2.5	--	1.4	2.4	--	--	--	--	--
Nonstocked	8.0	1.4	4.1	--	1.1	--	1.4	--	--	--	--
All types	50.3	3.5	17.4	2.7	10.1	8.4	1.4	3.6	--	3.2	--
WESTERN UNIT											
Eastern redcedar-hardwood	3.4	--	--	--	--	--	--	--	--	--	3.4
Oak-hickory	--	--	--	--	--	--	--	--	--	--	--
Post-blackjack oak	--	--	--	--	--	--	--	--	--	--	--
Upland plains hardwoods	--	--	--	--	--	--	--	--	--	--	--
Elm-ash-cottonwood	17.7	--	3.2	--	3.4	--	1.3	6.5	3.3	--	--
Cottonwood	5.1	--	--	--	--	2.5	--	--	--	--	2.6
Willow	--	--	--	--	--	--	--	--	--	--	--
Lowland plains hardwoods	5.1	--	2.5	--	--	--	2.6	--	--	--	--
Upland elm-ash-locust	2.5	--	--	2.5	--	--	--	--	--	--	--
Nonstocked	3.3	--	--	--	3.3	--	--	--	--	--	--
All types	37.1	--	5.7	2.5	6.7	2.5	3.9	6.5	3.3	--	6.0

Table 37.--Area of wooded strips by forest type and stand-age class, Kansas, 1981

(In thousand acres)

Forest type	All classes	Stand-age class (years)										
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101+
Eastern redcedar-hardwood	5.3	--	1.9	3.4	--	--	--	--	--	--	--	--
Oak-hickory	5.1	1.2	1.5	--	--	2.4	--	--	--	--	--	--
Post-blackjack oak	--	--	--	--	--	--	--	--	--	--	--	--
Upland plains hardwoods	6.4	--	3.6	--	1.4	--	1.4	--	--	--	--	--
Elm-ash-cottonwood	51.8	6.1	17.1	10.2	4.8	5.1	2.1	3.2	3.2	--	--	--
Cottonwood	5.1	--	2.5	--	--	--	--	2.6	--	--	--	--
Willow	2.0	1.0	--	--	1.0	--	--	--	--	--	--	--
Lowland plains hardwoods	35.2	8.5	7.8	3.8	5.4	2.8	2.6	2.7	1.6	--	--	--
Upland elm-ash-locust	19.9	3.0	3.9	3.8	5.3	--	--	2.5	--	1.4	--	--
Nonstocked	19.2	5.3	4.1	2.4	--	--	3.0	3.3	--	--	1.1	--
All types	150.0	25.1	42.4	23.6	17.9	10.3	9.1	14.3	4.8	1.4	1.1	--

Table 38.--Area of wooded strips by forest type, physiographic class, and ownership class, Kansas, 1981

(In thousand acres)

Forest type and physiographic class	All classes	Ownership class						
		National Forest	Misc. federal	Indian	State	County and municipal	Farmer	Misc. private
Eastern redcedar-hardwood								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	--	--	--	--	--	--	--	--
Mesic	--	--	--	--	--	--	--	--
Xeromesic	5.3	--	--	--	--	--	5.3	--
Xeric	--	--	--	--	--	--	--	--
All classes	5.3	--	--	--	--	--	5.3	--
Oak-hickory								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	1.5	--	--	--	--	--	1.5	--
Mesic	3.6	--	--	--	--	--	3.6	--
Xeromesic	--	--	--	--	--	--	--	--
Xeric	--	--	--	--	--	--	--	--
All classes	5.1	--	--	--	--	--	5.1	--
Post-blackjack oak								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	--	--	--	--	--	--	--	--
Mesic	--	--	--	--	--	--	--	--
Xeromesic	--	--	--	--	--	--	--	--
Xeric	--	--	--	--	--	--	--	--
All classes	--	--	--	--	--	--	--	--
Upland plains hardwoods								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	--	--	--	--	--	--	--	--
Mesic	1.4	--	--	--	--	--	1.4	--
Xeromesic	5.0	--	--	--	--	--	3.4	1.6
Xeric	--	--	--	--	--	--	--	--
All classes	6.4	--	--	--	--	--	4.8	1.6
Elm-ash-cottonwood								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	12.9	--	3.3	--	--	--	5.0	4.6
Mesic	38.9	--	1.3	--	--	--	33.5	4.1
Xeromesic	--	--	--	--	--	--	--	--
Xeric	--	--	--	--	--	--	--	--
All classes	51.8	--	4.6	--	--	--	38.5	8.7
Cottonwood								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	2.6	--	--	--	--	--	--	2.6
Mesic	--	--	--	--	--	--	--	--
Xeromesic	2.5	--	--	--	--	--	2.5	--
Xeric	--	--	--	--	--	--	--	--
All classes	5.1	--	--	--	--	--	2.5	2.6

(Table 38 continued on next page)

(Table 38 continued)

Forest type and physiographic class	All classes	Ownership class						
		National Forest	Misc. federal	Indian	State	County and municipal	Farmer	Misc. private
Willow								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	1.0	--	--	--	--	--	1.0	--
Mesic	1.0	--	--	--	--	--	1.0	--
Xeromesic	--	--	--	--	--	--	--	--
Xeric	--	--	--	--	--	--	--	--
All classes	2.0	--	--	--	--	--	2.0	--
Lowland plains hardwoods								
Hydric	1.4	--	--	--	--	--	1.4	--
Hydromesic	10.9	--	--	--	--	--	10.0	0.9
Mesic	22.9	--	--	--	--	--	18.3	4.6
Xeromesic	--	--	--	--	--	--	--	--
Xeric	--	--	--	--	--	--	--	--
All classes	35.2	--	--	--	--	--	29.7	5.5
Upland elm-ash-locust								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	--	--	--	--	--	--	--	--
Mesic	1.5	--	--	--	--	--	--	1.5
Xeromesic	15.6	--	1.2	--	--	--	7.8	6.6
Xeric	2.8	--	--	--	--	--	2.8	--
All classes	19.9	--	1.2	--	--	--	10.6	8.1
Nonstocked								
Hydric	--	--	--	--	--	--	--	--
Hydromesic	1.4	--	--	--	--	--	1.4	--
Mesic	10.8	--	--	--	--	--	7.7	3.1
Xeromesic	7.0	--	--	--	--	--	7.0	--
Xeric	--	--	--	--	--	--	--	--
All classes	19.2	--	--	--	--	--	16.1	3.1
All types								
Hydric	1.4	--	--	--	--	--	1.4	--
Hydromesic	30.3	--	3.3	--	--	--	18.9	8.1
Mesic	80.1	--	1.3	--	--	--	65.5	13.3
Xeromesic	35.4	--	1.2	--	--	--	26.0	8.2
Xeric	2.8	--	--	--	--	--	2.8	--
All classes	150.0	--	5.8	--	--	--	114.6	29.6

Table 39.--Area of wooded strips in private ownership by ownership class, owner tenure, and ownership-size class, Kansas, 1981

(In thousand acres)

Ownership class and owner tenure	All classes	Ownership-size class (acres)						
		1-5	5-10	10-20	20-50	50-100	100-500	500+
ALL UNITS								
Farmer								
1-4 years	14.2	--	3.7	5.1	1.0	4.4	--	--
5-9 years	19.3	3.3	4.1	6.2	2.9	2.8	--	--
10-19 years	24.5	--	8.2	7.9	7.1	1.3	--	--
20+ years	56.7	1.6	25.9	15.9	8.7	2.4	2.2	--
Total	114.7	4.9	41.9	35.1	19.7	10.9	2.2	--
Miscellaneous private corporation								
1-4 years	1.4	--	1.4	--	--	--	--	--
5-9 years	1.0	--	--	--	--	--	1.0	--
10-19 years	--	--	--	--	--	--	--	--
20+ years	--	--	--	--	--	--	--	--
Total	2.4	--	1.4	--	--	--	1.0	--
Miscellaneous private individual								
1-4 years	3.7	--	--	2.3	1.4	--	--	--
5-9 years	4.4	3.0	1.4	--	--	--	--	--
10-19 years	5.2	0.9	--	4.3	--	--	--	--
20+ years	13.8	1.4	2.5	7.3	--	1.6	1.0	--
Total	27.1	5.3	3.9	13.9	1.4	1.6	1.0	--
All owners								
1-4 years	19.3	--	5.1	7.4	2.4	4.4	--	--
5-9 years	24.7	6.3	5.5	6.2	2.9	2.8	1.0	--
10-19 years	29.7	0.9	8.2	12.2	7.1	1.3	--	--
20+ years	70.5	3.0	28.4	23.2	8.7	4.0	3.2	--
Total	144.2	10.2	47.2	49.0	21.1	12.5	4.2	--
NORTHEASTERN UNIT								
Farmer								
1-4 years	7.1	--	1.5	1.2	--	4.4	--	--
5-9 years	11.4	--	2.7	4.6	2.9	1.2	--	--
10-19 years	12.1	--	5.6	2.9	3.6	--	--	--
20+ years	18.5	1.6	5.5	5.0	4.2	--	2.2	--
Total	49.1	1.6	15.3	13.7	10.7	5.6	2.2	--
Miscellaneous private corporation								
1-4 years	1.4	--	1.4	--	--	--	--	--
5-9 years	--	--	--	--	--	--	--	--
10-19 years	--	--	--	--	--	--	--	--
20+ years	--	--	--	--	--	--	--	--
Total	1.4	--	1.4	--	--	--	--	--
Miscellaneous private individual								
1-4 years	--	--	--	--	--	--	--	--
5-9 years	3.0	3.0	--	--	--	--	--	--
10-19 years	2.5	0.9	--	1.6	--	--	--	--
20+ years	6.6	1.4	--	2.6	--	1.6	1.0	--
Total	12.1	5.3	--	4.2	--	1.6	1.0	--
All owners								
1-4 years	8.5	--	2.9	1.2	--	4.4	--	--
5-9 years	14.4	3.0	2.7	4.6	2.9	1.2	--	--
10-19 years	14.6	0.9	5.6	4.5	3.6	--	--	--
20+ years	25.1	3.0	5.5	7.6	4.2	1.6	3.2	--
Total	62.6	6.9	16.7	17.9	10.7	7.2	3.2	--

(Table 39 continued on next page)

(Table 39 continued)

Ownership class and owner tenure	All classes	Ownership-size class (acres) 1-5	5-10	10-20	20-50	50-100	100-500	500+
SOUTHEASTERN UNIT								
Farmer								
1-4 years	7.1	--	2.2	3.9	1.0	--	--	--
5-9 years	4.6	--	1.4	1.6	--	1.6	--	--
10-19 years	12.4	--	2.6	5.0	3.5	1.3	--	--
20+ years	13.4	--	2.4	7.5	1.1	2.4	--	--
Total	37.5	--	8.6	18.0	5.6	5.3	--	--
Miscellaneous private corporation								
1-4 years	--	--	--	--	--	--	--	--
5-9 years	1.0	--	--	--	--	--	1.0	--
10-19 years	--	--	--	--	--	--	--	--
20+ years	--	--	--	--	--	--	--	--
Total	1.0	--	--	--	--	--	1.0	--
Miscellaneous private individual								
1-4 years	3.7	--	--	2.3	1.4	--	--	--
5-9 years	1.4	--	1.4	--	--	--	--	--
10-19 years	2.7	--	--	2.7	--	--	--	--
20+ years	1.4	--	--	1.4	--	--	--	--
Total	9.2	--	1.4	6.4	1.4	--	--	--
All owners								
1-4 years	10.8	--	2.2	6.2	2.4	--	--	--
5-9 years	7.0	--	2.8	1.6	--	1.6	1.0	--
10-19 years	15.1	--	2.6	7.7	3.5	1.3	--	--
20+ years	14.8	--	2.4	8.9	1.1	2.4	--	--
Total	47.7	--	10.0	24.4	7.0	5.3	1.0	--
WESTERN UNIT								
Farmer								
1-4 years	--	--	--	--	--	--	--	--
5-9 years	3.3	3.3	--	--	--	--	--	--
10-19 years	--	--	--	--	--	--	--	--
20+ years	24.8	--	18.0	3.4	3.4	--	--	--
Total	28.1	3.3	18.0	3.4	3.4	--	--	--
Miscellaneous private corporation								
1-4 years	--	--	--	--	--	--	--	--
5-9 years	--	--	--	--	--	--	--	--
10-19 years	--	--	--	--	--	--	--	--
20+ years	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--
Miscellaneous private individual								
1-4 years	--	--	--	--	--	--	--	--
5-9 years	--	--	--	--	--	--	--	--
10-19 years	--	--	--	--	--	--	--	--
20+ years	5.8	--	2.5	3.3	--	--	--	--
Total	5.8	--	2.5	3.3	--	--	--	--
All owners								
1-4 years	--	--	--	--	--	--	--	--
5-9 years	3.3	3.3	--	--	--	--	--	--
10-19 years	--	--	--	--	--	--	--	--
20+ years	30.6	--	20.5	6.7	3.4	--	--	--
Total	33.9	3.3	20.5	6.7	3.4	--	--	--

Table 40.--Number of all live trees on commercial forest land by species group and diameter class, Kansas, 1981

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS															
Eastern redcedar	8,560	4,553	2,393	997	408	84	69	39	10	2	5	--	--	--	--
Total	8,560	4,553	2,393	997	408	84	69	39	10	2	5	--	--	--	--
HARDWOODS															
Bur oak	8,760	3,323	1,100	1,133	715	524	332	288	299	264	209	198	279	88	8
Select white oak	13,569	2,932	3,198	2,463	1,908	1,460	702	346	253	125	81	44	49	7	1
Other white oak	13,305	2,334	5,017	3,098	1,409	809	294	187	87	48	6	10	6	--	--
Select red oak	8,696	2,420	1,904	899	950	795	647	322	265	167	141	63	92	28	3
Other red oak	7,875	2,964	1,327	1,253	866	460	346	184	133	105	79	59	78	19	2
Select hickory	14,239	8,299	2,237	1,960	899	362	198	151	61	49	15	4	4	--	--
Other hickory	12,579	6,802	2,943	1,474	730	378	150	66	12	11	7	3	3	--	--
Pecan	2,783	832	937	317	220	204	107	69	37	23	13	15	5	4	--
Hard maple	4,477	2,872	944	260	235	88	51	19	2	2	2	1	--	1	--
Soft maple	3,209	1,322	505	292	279	194	122	150	98	78	47	36	60	20	6
Ash	38,977	19,576	8,911	4,173	2,791	1,445	681	545	306	246	110	70	117	6	--
Cottonwood	8,576	1,834	366	1,215	997	1,085	816	658	452	269	252	107	303	158	64
Basswood	5,162	3,681	643	259	171	136	108	70	38	21	19	9	6	1	--
Elm	98,365	67,331	19,142	6,684	2,684	1,202	542	297	161	111	69	43	84	14	1
Black walnut	27,581	10,664	6,161	4,485	2,085	1,833	1,077	639	356	153	64	44	16	4	--
Willow	5,094	2,517	904	466	332	238	245	153	94	60	45	19	19	1	1
Boxelder	12,941	5,172	2,862	2,087	1,144	660	436	197	159	108	44	30	32	9	1
Hackberry	54,901	28,513	12,848	5,238	3,149	1,943	1,215	762	538	303	174	105	87	26	--
Sycamore	2,315	798	567	140	207	108	106	73	96	51	37	39	55	31	7
Other hardwoods	53,074	27,537	11,647	6,665	3,286	1,583	1,023	547	336	185	122	60	64	18	1
Noncommercial species	58,163	35,575	13,691	4,894	2,160	926	498	177	117	60	25	17	20	3	--
Total	454,641	237,298	97,854	49,455	27,217	16,433	9,696	5,900	3,900	2,439	1,561	976	1,379	438	95
All species	463,201	241,851	100,247	50,452	27,625	16,517	9,765	5,939	3,910	2,441	1,566	976	1,379	438	95

Table 41.--Number of growing-stock trees on commercial forest land by species group and diameter class, Kansas, 1981

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS															
Eastern redcedar	7,926	4,430	2,255	766	314	66	63	22	3	2	5	--	--	--	--
Total	7,926	4,430	2,255	766	314	66	63	22	3	2	5	--	--	--	--
HARDWOODS															
Bur oak	6,707	2,504	894	868	527	422	221	225	233	208	172	152	212	65	4
Select white oak	7,626	1,856	1,804	1,198	922	809	428	242	174	82	52	24	30	5	--
Other white oak	10,252	1,502	4,174	2,347	1,108	666	179	163	67	34	4	5	3	--	--
Select red oak	6,987	1,944	1,520	656	834	683	524	226	214	141	108	40	77	18	2
Other red oak	5,659	2,140	994	819	584	389	216	154	92	77	67	50	61	15	1
Select hickory	11,987	6,884	2,025	1,601	750	347	156	117	53	42	8	1	3	--	--
Other hickory	10,375	5,310	2,704	1,270	550	339	107	62	12	11	7	3	--	--	--
Pecan	2,198	707	684	204	207	185	89	50	27	18	8	11	4	4	--
Hard maple	3,605	2,360	683	198	211	81	45	19	2	2	2	1	--	1	--
Soft maple	2,071	797	226	177	258	141	87	116	84	63	38	28	43	10	3
Ash	31,604	16,178	7,589	3,029	2,202	1,149	482	388	216	168	74	42	82	5	--
Cottonwood	7,574	1,581	366	1,168	798	972	675	577	417	250	230	88	278	131	43
Basswood	3,105	2,115	432	198	86	72	79	59	26	19	7	9	3	--	--
Elm	73,418	53,415	13,971	3,427	1,410	620	196	169	73	42	29	25	35	6	--
Black walnut	22,281	8,778	4,961	3,572	1,602	1,537	839	517	266	126	41	31	8	3	--
Willow	4,236	2,275	904	316	205	132	147	104	66	40	24	12	10	--	1
Boxelder	7,033	3,507	1,487	948	584	201	164	67	38	26	6	3	2	--	--
Hackberry	42,443	22,043	10,313	3,884	2,257	1,497	896	584	430	241	130	82	67	19	--
Sycamore	2,010	798	449	112	135	73	94	64	93	47	31	39	45	24	6
Other hardwoods	30,305	17,739	7,006	2,560	1,315	724	387	227	154	102	46	25	16	4	--
Total	291,476	154,433	63,186	28,552	16,545	11,039	6,011	4,130	2,737	1,739	1,084	671	979	310	60
All species	299,402	158,863	65,441	29,318	16,859	11,105	6,074	4,152	2,740	1,741	1,089	671	979	310	60

Table 42.--Number of short-log trees on commercial forest land by species group and diameter class, Kansas, 1981

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS													
Eastern redcedar	140	67	53	7	--	9	4	--	--	--	--	--	--
Total	140	67	53	7	--	9	4	--	--	--	--	--	--
HARDWOODS													
Bur oak	419	135	32	65	53	24	23	24	6	16	28	11	2
Select white oak	791	217	196	195	92	33	30	11	5	4	7	1	--
Other white oak	581	324	126	69	57	--	3	--	--	--	2	--	--
Select red oak	274	80	62	39	39	35	10	--	4	2	2	1	--
Other red oak	435	136	148	47	71	8	16	7	--	--	2	--	--
Select hickory	252	153	68	6	--	17	2	--	4	2	--	--	--
Other hickory	233	122	55	32	18	4	--	--	--	--	2	--	--
Pecan	65	25	13	--	5	8	3	5	2	4	--	--	--
Hard maple	36	30	--	--	6	--	--	--	--	--	--	--	--
Soft maple	60	--	--	16	19	7	7	3	2	--	5	1	--
Ash	668	164	196	115	48	55	47	18	11	2	12	--	--
Cottonwood	268	--	60	41	107	9	23	5	7	6	4	4	2
Basswood	49	--	--	17	17	3	5	--	4	--	2	1	--
Elm	1,859	957	481	208	90	46	33	16	9	3	13	3	--
Black walnut	860	318	163	161	108	59	28	7	9	5	2	--	--
Willow	91	27	--	27	15	10	4	4	4	--	--	--	--
Boxelder	523	175	120	97	28	28	40	30	5	--	--	--	--
Hackberry	1,354	464	376	148	169	107	41	23	11	7	6	2	--
Sycamore	56	--	46	--	7	--	3	--	--	--	--	--	--
Other hardwoods	2,085	1,081	565	191	96	79	35	13	9	8	6	1	1
Total	10,959	4,408	2,707	1,474	1,045	532	353	166	92	59	93	25	5
All species	11,099	4,475	2,760	1,481	1,045	541	357	166	92	59	93	25	5

Table 43.--Net volume of growing stock and sawtimber on commercial forest land by species group, Kansas, 1965 and 1981

Species group	Growing stock		Sawtimber	
	1965[1/]	1981	1965[1/]	1981
	Thousand cubic feet		Thousand board feet[2/]	
SOFTWOODS				
Eastern redcedar	216	4,591	511	10,871
Total	216	4,591	511	10,871
HARDWOODS				
Bur oak	36,925	60,920	173,124	286,120
Select white oak	11,501	34,121	36,194	107,383
Other white oak	10,484	19,854	19,229	36,531
Select red oak	26,020	45,828	103,966	183,457
Other red oak	19,438	27,445	84,208	118,665
Hickory	13,103	29,081	30,502	67,696
Pecan	8,040	8,986	36,974	28,043
Hard maple	2,259	3,120	5,563	6,280
Soft maple	9,005	21,011	37,644	87,834
Ash	35,714	61,700	107,524	185,760
Cottonwood	101,052	134,292	459,058	610,060
Basswood	3,614	6,031	15,438	25,763
Elm	89,243	30,599	358,279	69,531
Black walnut	36,751	57,868	107,950	169,979
Willow	10,772	11,629	44,370	47,901
Hackberry	48,909	86,674	169,049	299,581
Sycamore	24,613	21,538	125,288	105,631
Other hardwoods	14,941	46,027	38,675	119,143
Total	502,384	706,724	1,953,035	2,555,358
All species	502,600	711,315	1,953,546	2,566,229

[1/] Figures have been adjusted from those published after the 1965 survey to conform to 1981 areas because of changes in survey definitions and procedures.

[2/] International 1/4-inch rule.

Table 44.--Net volume of all live trees on commercial forest land by species group and diameter class, Kansas, 1981

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS													
Eastern redcedar	5,560	1,757	1,507	555	880	495	165	65	136	--	--	--	--
Total	5,560	1,757	1,507	555	880	495	165	65	136	--	--	--	--
HARDWOODS													
Bur oak	74,323	2,702	2,776	3,714	3,441	4,121	6,020	7,350	7,189	8,217	17,306	9,659	1,828
Select white oak	51,342	6,172	8,006	9,441	7,059	4,882	4,516	3,154	2,573	1,664	3,060	690	125
Other white oak	23,758	5,753	5,035	4,691	2,447	2,530	1,537	1,112	170	231	252	--	--
Select red oak	50,853	2,237	4,375	5,853	7,090	4,566	5,710	4,465	4,779	2,314	6,201	2,729	534
Other red oak	32,530	2,042	3,197	3,148	3,594	3,053	2,703	2,819	2,814	2,710	4,309	1,797	344
Select hickory	19,345	3,617	3,753	3,022	2,133	2,721	1,484	1,634	533	190	258	--	--
Other hickory	13,245	2,768	3,038	3,057	1,837	1,211	312	373	348	175	126	--	--
Pecan	10,586	676	1,036	1,963	1,597	1,187	1,071	667	565	884	456	484	--
Hard maple	3,389	533	1,033	563	549	279	49	43	99	113	--	128	--
Soft maple	24,380	657	1,527	1,621	1,531	2,746	2,478	2,445	2,104	1,815	3,780	2,084	1,592
Ash	74,481	8,696	12,292	10,909	7,291	8,434	6,452	6,441	3,937	2,686	6,802	541	--
Cottonwood	145,155	2,707	4,588	9,618	11,409	13,089	11,941	9,544	11,156	6,362	25,242	21,936	17,563
Basswood	7,565	466	641	929	1,328	1,224	945	658	439	510	247	63	115
Elm	52,613	12,449	9,859	7,109	4,746	4,001	2,691	2,468	2,086	1,715	4,108	1,293	88
Black walnut	68,747	9,982	8,417	12,767	11,299	9,683	7,058	4,238	2,123	1,879	827	474	--
Willow	15,402	783	1,190	1,472	2,520	2,611	1,898	1,792	1,485	634	893	4	120
Boxelder	22,328	3,635	3,634	3,200	3,341	2,261	2,078	1,970	622	652	590	304	41
Hackberry	104,831	10,607	12,300	13,297	13,423	12,380	12,255	9,010	6,749	4,775	6,389	3,646	--
Sycamore	22,924	272	836	813	1,226	1,219	2,592	1,746	1,644	2,268	4,017	4,414	1,877
Other hardwoods	65,918	11,230	11,632	8,701	8,459	6,725	5,846	4,536	2,857	2,037	2,452	1,314	129
Noncommercial species	33,298	9,641	7,383	4,870	4,022	2,059	1,979	1,039	767	516	866	156	--
Total	917,013	97,625	106,548	110,758	100,342	90,982	81,615	67,504	55,039	42,347	88,181	51,716	24,356
All species	922,573	99,382	108,055	111,313	101,222	91,477	81,780	67,569	55,175	42,347	88,181	51,716	24,356

Table 45.--Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Kansas, 1981

(In thousand cubic feet)

Class of timber	All species	Softwoods	Hardwoods
LIVE TREES			
Growing-stock trees			
Sawtimber			
Saw log portion	392,254	1,762	390,492
Upper stem portion	98,594	176	98,418
Subtotal	490,848	1,938	488,910
Poletimber	220,467	2,653	217,814
Total growing stock	711,315	4,591	706,724
Cull trees			
Rough and rotten cull trees			
Sawtimber	72,857	221	72,636
Poletimber	70,972	338	70,634
Subtotal	143,829	559	143,270
Short-log trees	67,429	410	67,019
Total cull	211,258	969	210,289
TOTAL LIVE TREES	922,573	5,560	917,013
SALVABLE DEAD TREES	4,448	68	4,380
ALL CLASSES	927,021	5,628	921,393

Table 46.--Net volume of growing-stock, sawtimber, short-log, and rough and rotten trees on commercial forest land by individual species, Kansas, 1981

Species	Total all live	Growing stock	Short-log cull	Rough and rotten cull	Sawtimber
	Thousand cubic feet				Thousand board feet[1/]
Eastern redcedar	5,560	4,591	410	559	10,871
Bur oak	74,323	60,920	6,634	6,769	286,120
White oak	2,988	2,663	243	82	10,136
Chinkapin oak	48,354	31,458	4,632	12,264	97,247
Post oak	23,758	19,854	1,787	2,117	36,531
Northern red oak	50,034	45,152	1,723	3,159	180,754
Shumard oak	819	676	32	111	2,703
Black oak	21,214	18,536	977	1,701	80,893
Blackjack oak	4,519	2,400	1,077	1,042	3,827
Pin oak	6,474	6,186	43	245	33,378
Shingle oak	323	323	--	--	567
Shellbark hickory	1,667	1,481	90	96	2,936
Mockernut hickory	1,752	1,401	155	196	5,741
Shagbark hickory	15,926	14,506	683	737	34,370
Bitternut hickory	12,740	11,270	883	587	23,281
Black hickory	505	423	51	31	1,368
Pecan	10,586	8,986	757	843	28,043
Sugar maple	3,389	3,120	125	144	6,280
Silver maple	24,380	21,011	1,078	2,291	87,834
White ash	2,080	1,641	188	251	4,191
Green ash	72,401	60,059	5,258	7,084	181,569
Eastern cottonwood	145,155	134,292	4,011	6,852	610,060
American basswood	7,565	6,031	734	800	25,763
American elm	41,985	25,366	5,690	10,929	59,400
Siberian elm	1,041	343	264	434	271
Slippery elm	9,587	4,890	2,056	2,641	9,860
Black walnut	68,747	57,868	5,495	5,384	169,979
Black willow	15,402	11,629	821	2,952	47,901
Boxelder	22,328	10,376	3,487	8,465	22,839
Hackberry	104,831	86,674	9,118	9,039	299,581
American sycamore	22,924	21,538	250	1,136	105,631
Black cherry	1,936	1,250	366	320	3,455
Black locust	4,357	2,636	627	1,094	5,293
Honeylocust	27,648	16,555	3,739	7,354	49,897
Kentucky coffeetree	6,771	5,389	424	958	19,474
Northern catalpa	3,092	1,107	358	1,627	2,151
Common persimmon	1,347	1,113	24	210	612
Red mulberry	19,463	6,448	3,119	9,896	11,575
River birch	818	781	--	37	2,278
Sugarberry	399	344	--	55	1,569
Texas buckeye	87	28	20	39	--
All species[2/]	889,275	711,315	67,429	110,531	2,566,229

[1/] International 1/4-inch rule.

[2/] These totals do not include volume for noncommercial species. Volumes for individual noncommercial species are found in Table 47.

Table 47.--Net volume of noncommercial species (nongrowing-stock volume) on commercial forest land by individual species, Kansas, 1981

(In thousand cubic feet)

Species	Nongrowing-stock (rough tree) volume
Ailanthus	136
Eastern redbud	1,329
Hawthorn	63
Osage-orange	30,970
Eastern hophornbeam	800
All species	33,298

Table 48.--Net volume of growing stock on commercial forest land, by species group and Forest Survey Unit, Kansas, 1981

(In thousand cubic feet)

Species group	All Units	Forest Survey Unit: Northeastern Unit	Forest Survey Unit: Southeastern Unit	Forest Survey Unit: Western Unit
SOFTWOODS				
Eastern redcedar	4,591	2,446	2,112	33
Total	4,591	2,446	2,112	33
HARDWOODS				
Bur oak	60,920	29,902	15,644	15,374
Select white oak	34,121	22,050	12,071	--
Other white oak	19,854	2,107	17,747	--
Select red oak	45,828	25,577	20,251	--
Other red oak	27,445	15,385	12,060	--
Select hickory	17,388	11,801	5,587	--
Other hickory	11,693	6,665	5,028	--
Pecan	8,986	265	8,578	143
Hard maple	3,120	1,938	1,182	--
Soft maple	21,011	10,459	10,552	--
Ash	61,700	13,845	26,734	21,121
Cottonwood	134,292	43,561	9,786	80,945
Basswood	6,031	5,618	413	--
Elm	30,599	13,932	12,589	4,078
Black walnut	57,868	32,366	23,004	2,498
Willow	11,629	5,021	4,204	2,404
Boxelder	10,376	3,563	1,831	4,982
Hackberry	86,674	37,640	38,441	10,593
Sycamore	21,538	11,447	9,787	304
Other hardwoods	35,651	19,505	11,527	4,619
Total	706,724	312,647	247,016	147,061
All species	711,315	315,093	249,128	147,094

Table 49.--Net volume of sawtimber on commercial forest land, by species group and Forest Survey Unit, Kansas, 1981

(In thousand board feet)[1/]

Species group	All Units	Forest Survey Unit: Northeastern Unit	Forest Survey Unit: Southeastern Unit	Forest Survey Unit: Western Unit
SOFTWOODS				
Eastern redcedar	10,871	5,106	5,765	--
Total	10,871	5,106	5,765	--
HARDWOODS				
Bur oak	286,120	124,290	72,739	89,091
Select white oak	107,383	77,476	29,907	--
Other white oak	36,531	6,145	30,386	--
Select red oak	183,457	104,284	79,173	--
Other red oak	118,665	70,133	48,532	--
Select hickory	43,047	24,060	18,987	--
Other hickory	24,649	14,453	10,196	--
Pecan	28,043	575	26,708	760
Hard maple	6,280	3,635	2,645	--
Soft maple	87,834	44,464	43,370	--
Ash	185,760	42,154	87,049	56,557
Cottonwood	610,060	196,103	39,358	374,599
Basswood	25,763	24,807	956	--
Elm	69,531	25,507	29,537	14,487
Black walnut	169,979	96,526	65,992	7,461
Willow	47,901	19,065	16,467	12,369
Boxelder	22,839	5,924	6,077	10,838
Hackberry	299,581	112,814	137,513	49,254
Sycamore	105,631	56,268	47,653	1,710
Other hardwoods	96,304	53,824	29,536	12,944
Total	2,555,358	1,102,507	822,781	630,070
All species	2,566,229	1,107,613	828,546	630,070

[1/] International 1/4-inch rule.

Table 50.--Net volume of growing stock on commercial forest land by county and species group, Kansas, 1981

(In thousand cubic feet)

County	All species	Eastern redcedar	Bur oak	Select white oak	Other white oak	Select red oak	Other red oak	Select hickory	Other hickory	Pecan	Hard maple	Soft maple	Ash
						NORTHEASTERN UNIT							
						Species group							
Atchison	15,257	154	1,511	1,319	125	1,558	670	459	305	--	235	366	740
Brown	10,457	132	985	1,194	118	1,372	558	421	266	--	223	173	517
Clay	10,580	49	1,053	471	24	562	221	182	144	--	31	395	527
Dickinson	9,597	54	867	423	23	722	223	179	134	--	51	292	430
Doniphan	14,275	148	1,477	1,110	99	1,607	598	526	266	--	178	446	640
Douglas	12,833	163	840	850	163	1,059	1,327	1,049	498	--	18	310	287
Franklin	11,661	121	996	789	116	935	917	772	377	86	14	391	395
Geary	10,510	52	1,074	724	55	595	475	375	248	--	7	352	438
Jackson	12,804	76	1,314	707	46	883	194	316	150	--	5	791	839
Jefferson	21,868	170	1,607	1,437	215	1,615	2,061	1,391	713	--	12	552	637
Johnson	14,091	135	1,458	1,204	156	1,395	553	419	222	--	188	453	665
Leavenworth	28,197	92	2,572	1,689	145	1,789	2,187	1,038	642	75	2	872	1,076
Marshall	13,713	108	1,391	837	44	1,031	331	373	192	--	84	553	619
Miami	25,539	242	2,645	2,281	180	2,563	964	776	458	64	379	844	1,324
Nemaha	6,733	35	643	374	27	450	105	175	83	--	--	362	451
Osage	17,114	125	1,615	1,229	109	1,290	794	652	379	--	74	483	677
Pottawatomie	22,350	190	2,040	1,496	149	1,630	1,141	911	492	--	115	640	859
Riley	16,697	161	1,648	1,133	97	1,386	713	653	357	--	106	483	666
Shawnee	13,618	98	1,346	971	56	1,142	362	382	254	--	115	481	712
Wabaunsee	17,097	78	1,734	1,030	70	939	597	454	316	--	30	642	811
Washington	5,949	29	715	375	18	402	134	134	94	--	--	453	370
Wyandotte	4,153	34	371	407	72	652	260	164	75	40	71	125	165
All counties	315,093	2,446	29,902	22,050	2,107	25,577	15,385	11,801	6,665	265	1,938	10,459	13,845
						SOUTHEASTERN UNIT							
Allen	5,884	36	528	119	111	276	150	86	105	180	6	351	709
Anderson	7,855	76	597	262	392	519	274	157	130	283	21	376	829
Bourbon	22,505	165	1,078	1,834	2,518	2,665	1,635	741	624	386	212	572	1,776
Butler	13,210	56	777	269	141	684	350	207	180	676	5	863	2,132
Chase	6,451	33	667	110	53	252	141	82	133	151	5	425	765
Chautauqua	23,805	248	1,088	1,173	3,450	2,173	1,439	548	456	1,140	56	805	2,432
Cherokee	10,615	113	511	437	1,033	743	595	170	173	662	30	399	1,289
Coffey	4,132	66	218	198	390	277	248	75	65	241	19	112	369
Cowley	17,562	67	1,148	427	330	954	406	435	272	502	13	1,150	2,392
Crawford	13,088	110	1,047	516	539	1,018	388	217	220	398	56	630	1,490
Elk	14,054	131	645	634	1,332	1,278	731	325	257	651	45	561	1,622
Greenwood	13,017	102	1,240	265	341	641	362	153	223	412	13	651	1,382
Labette	7,380	98	364	363	803	535	450	141	123	448	31	245	804
Linn	30,993	308	2,022	2,369	1,882	3,385	1,946	779	860	645	355	1,027	2,713
Lyon	8,015	24	699	210	103	405	183	204	148	109	11	507	964
Marion	4,533	23	238	126	158	292	124	111	62	213	3	269	660
Montgomery	13,509	176	959	932	863	1,289	710	361	290	319	136	487	1,196
Morris	4,669	29	405	148	117	284	92	108	78	81	12	276	531
Neosho	6,724	70	327	302	755	491	393	123	117	387	18	233	750
Wilson	15,578	103	801	1,111	1,849	1,698	1,106	462	419	374	113	449	1,394
Woodson	5,549	78	285	266	587	392	337	102	93	320	22	164	635
All counties	249,128	2,112	15,644	12,071	17,747	20,251	12,060	5,587	5,028	8,578	1,182	10,552	26,734

(Table 50 continued on next page)

(Table 50 continued)

County	Species group								
	Cotton-wood	Bass-wood	Elm	Black walnut	Willow	Boxelder	Hackberry	Sycamore	Other hardwoods
NORTHEASTERN UNIT									
Atchison	1,792	299	529	1,430	151	133	2,112	614	755
Brown	517	168	345	1,075	90	130	1,177	420	576
Clay	2,301	219	381	956	175	100	1,745	481	563
Dickinson	2,061	211	348	864	194	95	1,509	473	444
Doniphan	1,307	344	533	1,568	222	165	1,740	446	855
Douglas	967	206	809	1,430	318	128	1,111	444	856
Franklin	1,016	180	626	1,383	159	132	1,091	319	846
Geary	1,790	170	447	1,164	115	69	1,333	363	664
Jackson	2,022	132	637	1,298	205	334	1,447	133	1,275
Jefferson	2,910	295	1,238	2,453	332	164	1,788	900	1,378
Johnson	1,326	341	545	1,418	175	173	1,924	584	757
Leavenworth	6,126	326	1,468	2,924	169	127	1,994	1,232	1,652
Marshall	2,060	300	650	1,335	396	221	1,812	485	891
Miami	2,347	560	963	2,517	252	318	3,476	972	1,414
Nemaha	1,123	69	310	708	97	195	774	60	692
Osage	2,446	268	737	1,780	423	181	2,158	712	982
Pottawatomie	2,993	440	941	2,167	673	262	3,085	881	1,245
Riley	2,292	344	699	1,693	287	187	2,149	615	1,028
Shawnee	1,896	284	517	1,357	260	179	1,862	458	886
Wabaunsee	3,296	273	751	1,725	231	157	2,274	621	1,068
Washington	871	49	318	629	62	88	619	95	494
Wyandotte	102	140	140	492	35	25	460	139	184
All counties	43,561	5,618	13,932	32,366	5,021	3,563	37,640	11,447	19,505
SOUTHEASTERN UNIT									
Allen	347	4	263	530	134	54	1,334	259	302
Anderson	392	8	394	731	148	65	1,491	302	408
Bourbon	440	59	1,089	2,022	129	165	2,682	794	919
Butler	701	7	775	1,197	401	107	2,297	709	676
Chase	377	3	233	527	142	56	1,659	296	341
Chautauqua	563	64	1,358	2,240	359	104	2,221	774	1,114
Cherokee	540	25	648	1,115	265	42	1,033	348	444
Coffey	264	12	252	492	93	20	445	103	173
Cowley	617	8	973	1,517	379	219	3,797	992	964
Crawford	689	9	606	1,178	254	111	2,490	541	581
Elk	490	25	817	1,308	254	82	1,611	529	726
Greenwood	1,005	12	605	1,231	299	125	2,847	469	639
Labette	315	19	435	801	160	27	696	223	299
Linn	1,109	54	1,221	2,723	320	156	4,720	1,101	1,298
Lyon	289	4	370	658	135	122	1,998	441	431
Marion	177	3	278	397	112	44	758	236	249
Montgomery	349	19	571	1,244	141	114	2,250	532	571
Morris	183	2	208	396	80	60	1,107	238	234
Neosho	313	18	404	710	149	28	652	209	275
Wilson	322	42	753	1,368	130	105	1,784	541	654
Woodson	304	16	336	619	120	25	569	150	229
All counties	9,786	413	12,589	23,004	4,204	1,831	38,441	9,787	11,527

(Table 50 continued on next page)

(Table 50 continued)

WESTERN UNIT

County	All species	Species group: Eastern redcedar	Bur oak	Select white oak	Other white oak	Select red oak	Other red oak	Select hickory	Other hickory	Pecan	Hard maple	Soft maple	Ash
Barber	5,793	--	558	--	--	--	--	--	--	--	--	--	627
Barton	853	--	114	--	--	--	--	--	--	--	--	--	150
Cheyenne	2,109	--	262	--	--	--	--	--	--	--	--	--	263
Clark	4,226	--	149	--	--	--	--	--	--	--	--	--	800
Cloud	7,886	--	1,037	--	--	--	--	--	--	--	--	--	676
Comanche	668	--	51	--	--	--	--	--	--	--	--	--	220
Decatur	1,527	--	223	--	--	--	--	--	--	--	--	--	208
Edwards	1,616	--	81	--	--	--	--	--	--	--	--	--	103
Ellis	1,924	--	261	--	--	--	--	--	--	--	--	--	268
Ellsworth	2,438	--	374	--	--	--	--	--	--	--	--	--	284
Finney	208	--	14	--	--	--	--	--	--	--	--	--	74
Ford	381	--	34	--	--	--	--	--	--	--	--	--	111
Gove	120	--	17	--	--	--	--	--	--	--	--	--	11
Graham	3,520	--	459	--	--	--	--	--	--	--	--	--	495
Grant	85	--	--	--	--	--	--	--	--	--	--	--	27
Gray	1,218	--	21	--	--	--	--	--	--	--	--	--	135
Greeley	20	--	--	--	--	--	--	--	--	--	--	--	--
Hamilton	1,940	6	135	--	--	--	--	--	--	--	--	--	747
Harper	3,857	--	352	--	--	--	--	--	--	--	--	--	676
Harvey	1,095	--	108	--	--	--	--	--	--	--	--	--	241
Haskell	--	--	--	--	--	--	--	--	--	--	--	--	--
Hodgeman	--	--	--	--	--	--	--	--	--	--	--	--	--
Jewell	6,175	--	545	--	--	--	--	--	--	--	--	--	990
Kearny	253	--	--	--	--	--	--	--	--	--	--	--	7
Kingman	6,624	--	557	--	--	--	--	--	--	--	--	--	1,099
Kiowa	216	6	13	--	--	--	--	--	--	--	--	--	27
Lane	46	--	7	--	--	--	--	--	--	--	--	--	12
Lincoln	2,454	--	285	--	--	--	--	--	--	--	--	--	305
Logan	608	6	85	--	--	--	--	--	--	--	--	--	98
McPherson	3,338	--	327	--	--	--	--	--	--	--	--	--	285
Meade	1,349	--	82	--	--	--	--	--	--	--	--	--	283
Mitchell	5,770	--	718	--	--	--	--	--	--	--	--	--	986
Morton	1,329	5	124	--	--	--	--	--	--	--	--	--	263
Ness	323	--	68	--	--	--	--	--	--	--	--	--	44
Norton	1,894	--	266	--	--	--	--	--	--	--	--	--	355
Osborne	5,334	--	714	--	--	--	--	--	--	--	--	--	657
Ottawa	5,503	--	732	--	--	--	--	--	--	--	--	--	929
Pawnee	1,280	--	93	--	--	--	--	--	--	--	--	--	185
Phillips	4,304	--	399	--	--	--	--	--	--	--	--	--	764
Pratt	1,538	--	103	--	--	--	--	--	--	--	--	--	130
Rawlins	1,461	--	228	--	--	--	--	--	--	--	--	--	195
Reno	5,515	--	512	--	--	--	--	--	--	--	--	--	978
Republic	6,077	--	498	--	--	--	--	--	--	--	--	--	751
Rice	1,748	--	99	--	--	--	--	--	--	--	--	--	105
Rooks	5,649	--	553	--	--	--	--	--	--	--	--	--	827
Rush	91	--	13	--	--	--	--	--	--	--	--	--	23
Russell	3,592	--	451	--	--	--	--	--	--	--	--	--	340

(Table 50 continued on next page)

(Table 50 continued)

WESTERN UNIT

County	Species group								
	Cotton-wood	Bass-wood	Elm	Black walnut	Willow	Boxelder	Hackberry	Sycamore	Other hardwoods
Barber	3,560	--	134	73	99	186	400	5	151
Barton	360	--	25	18	24	42	92	--	28
Cheyenne	1,072	--	66	37	44	92	206	3	64
Clark	2,782	--	49	35	39	92	223	--	57
Cloud	4,360	--	273	180	132	257	676	20	275
Comanche	259	--	15	10	11	37	49	--	16
Decatur	684	--	51	30	41	71	164	1	54
Edwards	1,228	--	63	11	17	29	61	--	23
Ellis	878	--	60	43	54	90	196	1	73
Ellsworth	1,157	--	77	52	45	97	252	8	92
Finney	84	--	5	--	3	7	18	--	3
Ford	146	--	12	7	8	27	24	--	12
Gove	58	--	3	4	3	6	14	--	4
Graham	1,723	--	111	63	74	148	318	7	122
Grant	46	--	--	3	--	7	--	--	2
Gray	1,008	--	8	--	5	11	26	--	4
Greeley	20	--	--	--	--	--	--	--	--
Hamilton	700	--	43	10	32	72	161	--	34
Harper	2,040	--	96	80	73	143	248	8	141
Harvey	516	--	40	7	24	54	76	--	29
Haskell	--	--	--	--	--	--	--	--	--
Hodgeman	--	--	--	--	--	--	--	--	--
Jewell	3,377	--	156	70	124	221	536	1	155
Kearny	226	--	--	--	--	--	20	--	--
Kingman	3,691	--	168	158	108	224	329	20	270
Kiowa	135	--	5	--	3	5	19	--	3
Lane	15	--	2	--	2	2	5	--	1
Lincoln	1,273	--	72	55	51	111	218	3	81
Logan	263	--	21	12	15	26	56	1	25
McPherson	2,068	--	94	61	54	111	243	4	91
Meade	752	--	27	18	20	40	101	--	26
Mitchell	2,785	--	157	136	85	233	403	24	243
Morton	647	--	40	14	32	52	115	--	37
Ness	126	--	13	7	3	10	33	3	16
Norton	786	--	72	27	48	90	179	3	68
Osborne	2,810	--	155	87	91	183	436	16	185
Ottawa	2,565	--	154	131	99	195	427	24	247
Pawnee	774	--	28	13	20	47	93	--	27
Phillips	2,168	--	111	95	100	203	307	3	154
Pratt	1,075	--	39	18	21	38	86	--	28
Rawlins	637	--	49	31	37	66	159	3	56
Reno	2,960	--	137	121	89	191	290	17	220
Republic	3,743	--	166	60	106	180	440	1	132
Rice	1,363	--	39	14	10	28	57	3	30
Rooks	3,250	--	136	78	82	183	363	12	165
Rush	30	--	5	--	3	5	9	--	3
Russell	1,990	--	115	67	67	124	319	7	112

(Table 50 continued on next page)

(Table 50 continued)

WESTERN UNIT

County	All species	Species group: Eastern redcedar	Bur oak	Select white oak	Other white oak	Select red oak	Other red oak	Select hickory	Other hickory	Pecan	Hard maple	Soft maple	Ash
Saline	2,507	--	379	--	--	--	--	--	--	--	--	--	334
Scott	102	--	26	--	--	--	--	--	--	--	--	--	17
Sedgwick	5,687	--	785	--	--	--	--	--	--	44	--	--	947
Seward	1,565	--	138	--	--	--	--	--	--	--	--	--	224
Sheridan	997	--	113	--	--	--	--	--	--	--	--	--	107
Sherman	--	--	--	--	--	--	--	--	--	--	--	--	--
Smith	2,513	--	315	--	--	--	--	--	--	--	--	--	388
Stafford	3,904	10	101	--	--	--	--	--	--	--	--	--	153
Stanton	10	--	--	--	--	--	--	--	--	--	--	--	--
Stevens	425	--	61	--	--	--	--	--	--	--	--	--	68
Sumner	13,787	--	1,596	--	--	--	--	--	--	99	--	--	1,850
Thomas	522	--	17	--	--	--	--	--	--	--	--	--	11
Trego	1,044	--	121	--	--	--	--	--	--	--	--	--	241
Wallace	76	--	--	--	--	--	--	--	--	--	--	--	27
Wichita	--	--	--	--	--	--	--	--	--	--	--	--	--
All counties	147,094	33	15,374	--	--	--	--	--	--	143	--	--	21,121
All units	711,315	4,591	60,920	34,121	19,854	45,828	27,445	17,388	11,693	8,986	3,120	21,011	61,700

(Table 50 continued)

(Table 50 continued)

WESTERN UNIT

County	Species group: Cotton-wood	Bass-wood	Elm	Black walnut	Willow	Boxelder	Hackberry	Sycamore	Other hardwoods
Saline	1,152	--	87	60	46	105	237	8	99
Scott	33	--	5	2	--	2	10	1	6
Sedgwick	2,615	--	166	140	86	206	396	31	271
Seward	850	--	36	34	37	66	131	--	49
Sheridan	564	--	25	19	21	35	79	1	33
Sherman	--	--	--	--	--	--	--	--	--
Smith	1,187	--	79	39	66	112	250	--	77
Stafford	3,371	--	59	21	21	50	78	--	40
Stanton	10	--	--	--	--	--	--	--	--
Stevens	177	--	16	7	13	21	47	--	15
Sumner	7,845	--	481	212	98	291	833	61	421
Thomas	458	--	3	4	3	6	14	--	6
Trego	456	--	29	21	15	45	71	4	41
Wallace	37	--	--	3	--	7	--	--	2
Wichita	--	--	--	--	--	--	--	--	--
All counties	80,945	--	4,078	2,498	2,404	4,982	10,593	304	4,619
All units	134,292	6,031	30,599	57,868	11,629	10,376	86,674	21,538	35,651

Table 51.--Net volume of sawtimber on commercial forest land by county and species group, Kansas, 1981

(In thousand board feet)[1/]

County	All species	Eastern redcedar	Bur oak	Select white oak	Other white oak	Select red oak	Other red oak	Select hickory	Other hickory	Pecan	Hard maple	Soft maple	Ash
						NORTHEASTERN UNIT							
						Species group							
Atchison	54,573	366	6,083	4,934	246	6,233	2,964	1,196	864	--	417	1,463	2,252
Brown	36,117	296	3,781	4,463	227	5,619	2,541	1,116	748	--	381	759	1,636
Clay	39,325	118	4,730	1,806	64	2,107	907	489	343	--	81	1,472	1,610
Dickinson	35,993	132	3,752	1,524	52	2,929	859	554	492	--	114	1,087	1,242
Doniphan	49,986	295	6,220	3,694	251	6,603	2,704	1,382	1,029	--	351	1,833	1,882
Douglas	42,640	268	3,111	2,890	629	5,120	6,583	1,467	667	--	--	1,455	515
Franklin	38,529	214	3,949	2,634	439	4,205	4,534	1,133	508	184	--	1,817	1,076
Geary	36,690	108	4,473	2,523	177	2,373	2,238	687	428	--	14	1,446	1,315
Jackson	43,704	185	5,918	1,928	229	2,659	956	405	82	--	4	3,744	2,978
Jefferson	74,959	276	5,903	5,037	786	7,190	9,657	2,127	1,015	--	--	2,506	1,541
Johnson	49,515	290	6,286	4,305	329	5,781	2,376	1,227	735	--	376	1,715	2,033
Leavenworth	102,048	172	9,657	6,143	418	7,288	9,004	1,838	1,027	161	--	4,046	3,276
Marshall	48,596	205	6,316	2,969	128	4,300	1,532	955	503	--	194	2,237	1,939
Miami	90,212	560	11,131	8,514	362	10,300	4,383	2,243	1,508	138	738	3,393	4,267
Nemaha	23,062	75	2,941	980	141	1,453	509	198	17	--	--	1,626	1,473
Osage	59,394	268	6,721	4,320	329	4,948	3,717	1,256	642	--	112	2,018	2,002
Pottawatomie	78,642	399	8,642	5,317	481	6,792	5,365	1,686	971	--	204	2,538	2,394
Riley	58,691	316	7,011	3,953	292	5,651	3,327	1,290	730	--	180	1,940	1,856
Shawnee	48,657	209	5,842	3,476	130	4,536	1,612	1,095	926	--	241	1,933	2,320
Wabaunsee	60,783	181	7,414	3,715	208	3,554	2,678	901	514	--	66	2,649	2,565
Washington	20,775	95	3,039	1,239	60	1,740	626	236	114	--	--	2,285	1,535
Wyandotte	14,722	78	1,370	1,112	167	2,903	1,061	579	590	92	162	502	447
All counties	1,107,613	5,106	124,290	77,476	6,145	104,284	70,133	24,060	14,453	575	3,635	44,464	42,154
						SOUTHEASTERN UNIT							
Allen	21,738	92	2,647	362	152	1,042	633	328	307	573	16	1,596	2,344
Anderson	27,000	249	2,891	752	514	2,036	1,000	575	343	896	55	1,640	2,647
Bourbon	71,539	396	4,404	4,255	4,524	10,508	7,495	2,413	937	1,433	440	1,998	5,348
Butler	46,894	105	4,001	758	294	2,578	1,380	895	384	1,648	11	3,518	7,694
Chase	24,968	63	3,390	345	122	911	711	265	419	504	11	2,034	2,512
Chautauqua	67,063	624	4,452	3,105	5,223	8,925	3,804	1,537	737	3,158	153	3,066	7,863
Cherokee	31,617	362	2,188	1,184	1,572	3,006	1,708	468	322	2,013	83	1,500	4,260
Coffey	12,314	226	901	556	627	1,114	768	202	153	896	52	388	1,080
Cowley	63,884	146	5,837	1,120	561	3,509	1,605	2,083	602	1,349	33	4,610	8,511
Crawford	46,381	279	5,111	1,182	961	3,925	1,734	753	597	1,234	115	2,797	4,666
Elk	43,253	309	2,879	1,669	2,117	5,170	2,539	1,066	400	1,662	104	2,154	5,507
Greenwood	46,996	261	6,025	886	418	2,550	1,526	471	703	1,501	34	2,976	4,171
Labette	21,649	341	1,531	976	1,234	2,145	1,282	398	235	1,455	88	920	2,606
Linn	108,858	872	9,424	5,203	4,319	12,957	10,506	2,409	1,684	2,443	741	4,601	8,340
Lyon	30,369	39	3,492	564	220	1,461	919	923	364	368	24	2,128	3,303
Marion	15,386	64	1,188	360	241	1,113	406	428	114	497	7	1,048	2,352
Montgomery	46,711	572	4,488	2,014	1,877	4,805	3,312	1,327	634	1,311	303	2,067	3,686
Morris	17,333	68	2,024	357	241	1,035	413	441	222	283	24	1,192	1,731
Neosho	19,672	223	1,361	830	1,129	1,999	1,102	317	217	1,211	52	868	2,412
Wilson	48,604	208	3,327	2,699	3,127	6,802	4,691	1,408	625	1,148	236	1,683	4,392
Woodson	16,317	266	1,178	730	913	1,582	998	280	197	1,125	63	586	1,624
All counties	828,546	5,765	72,739	29,907	30,386	79,173	48,532	18,987	10,196	26,708	2,645	43,370	87,049

(Table 51 continued on next page)

[1/] International 1/4-inch rule.

(Table 51 continued)

County	Species group								
	Cotton-wood	Bass-wood	Elm	Black walnut	Willow	Boxelder	Hackberry	Sycamore	Other hardwoods
NORTHEASTERN UNIT									
Atchison	8,305	1,335	1,073	4,589	510	129	6,462	2,993	2,159
Brown	2,220	708	592	3,191	395	160	3,475	2,047	1,762
Clay	10,634	1,048	838	3,097	568	124	5,475	2,264	1,550
Dickinson	9,590	986	755	2,930	713	64	4,716	2,183	1,319
Doniphan	5,429	1,536	1,000	5,042	622	269	5,271	2,130	2,443
Douglas	4,079	850	1,519	3,784	1,535	177	3,242	2,333	2,416
Franklin	4,187	738	1,125	3,725	748	262	3,174	1,674	2,203
Geary	7,606	717	905	3,527	407	112	4,036	1,780	1,818
Jackson	9,697	662	940	3,475	904	900	4,132	730	3,176
Jefferson	13,421	1,140	2,174	6,745	1,530	269	5,049	4,673	3,920
Johnson	5,521	1,579	1,185	4,368	499	174	5,960	2,643	2,133
Leavenworth	29,964	1,152	2,003	8,475	612	258	5,490	6,509	4,555
Marshall	8,787	1,409	1,135	4,078	1,240	311	5,486	2,309	2,563
Miami	10,034	2,567	1,742	7,787	813	377	10,601	4,735	4,019
Nemaha	5,519	362	512	1,893	472	549	2,280	326	1,736
Osage	10,789	1,164	1,521	5,255	1,646	307	6,399	3,382	2,598
Pottawatomie	13,621	1,999	1,929	6,478	2,506	415	9,320	4,270	3,315
Riley	10,314	1,541	1,304	5,157	1,165	251	6,633	2,956	2,824
Shawnee	8,034	1,299	969	4,207	969	299	5,732	2,197	2,631
Wabaunsee	14,466	1,211	1,537	5,214	798	285	6,916	3,039	2,872
Washington	3,657	190	374	1,729	293	210	1,614	535	1,204
Wyandotte	229	614	375	1,780	120	22	1,351	560	608
All counties	196,103	24,807	25,507	96,526	19,065	5,924	112,814	56,268	53,824
SOUTHEASTERN UNIT									
Allen	1,341	2	671	1,702	488	154	5,200	1,362	726
Anderson	1,522	12	934	2,105	547	202	5,656	1,556	868
Bourbon	1,935	216	2,500	5,887	525	619	9,119	3,674	2,913
Butler	2,854	1	1,822	3,558	1,661	362	8,109	3,475	1,786
Chase	1,457	1	625	1,875	512	135	6,649	1,590	837
Chautauqua	2,431	36	2,892	5,139	1,560	348	6,307	3,451	2,252
Cherokee	2,096	15	1,453	2,755	1,028	137	3,009	1,512	946
Coffey	954	9	615	1,213	303	67	1,405	452	333
Cowley	2,551	8	2,628	4,781	1,581	778	13,720	5,130	2,741
Crawford	2,697	21	1,405	3,774	934	346	9,595	2,763	1,492
Elk	2,059	46	1,733	3,235	1,073	291	5,207	2,447	1,586
Greenwood	3,741	5	1,519	3,782	930	368	11,252	2,486	1,391
Labette	1,232	16	987	1,918	637	87	1,975	973	613
Linn	4,558	318	2,667	8,671	1,235	449	18,265	5,260	3,936
Lyon	1,187	12	1,070	2,231	531	427	7,488	2,360	1,258
Marion	736	1	662	1,158	472	161	2,591	1,166	621
Montgomery	1,484	90	1,411	3,793	590	393	8,224	2,683	1,647
Morris	729	1	579	1,346	302	201	4,215	1,271	658
Neosho	1,208	9	915	1,762	571	90	1,900	910	586
Wilson	1,461	126	1,654	3,807	566	379	5,903	2,474	1,888
Woodson	1,125	11	795	1,500	421	83	1,724	658	458
All counties	39,358	956	29,537	65,992	16,467	6,077	137,513	47,653	29,536

(Table 51 continued on next page)

(Table 51 continued)

WESTERN UNIT

County	All species	Species group: Eastern redcedar	Bur oak	Select white oak	Other white oak	Select red oak	Other red oak	Select hickory	Other hickory	Pecan	Hard maple	Soft maple	Ash
Barber	24,420	--	3,286	--	--	--	--	--	--	--	--	--	2,098
Barton	3,602	--	682	--	--	--	--	--	--	--	--	--	384
Cheyenne	9,479	--	1,546	--	--	--	--	--	--	--	--	--	926
Clark	16,070	--	894	--	--	--	--	--	--	--	--	--	862
Cloud	35,800	--	6,038	--	--	--	--	--	--	--	--	--	2,585
Comanche	2,343	--	301	--	--	--	--	--	--	--	--	--	432
Decatur	6,682	--	1,325	--	--	--	--	--	--	--	--	--	731
Edwards	7,701	--	485	--	--	--	--	--	--	--	--	--	344
Ellis	8,415	--	1,554	--	--	--	--	--	--	--	--	--	870
Ellsworth	11,295	--	2,171	--	--	--	--	--	--	--	--	--	1,050
Finney	644	--	81	--	--	--	--	--	--	--	--	--	101
Ford	1,432	--	199	--	--	--	--	--	--	--	--	--	342
Gove	564	--	102	--	--	--	--	--	--	--	--	--	40
Graham	15,315	--	2,689	--	--	--	--	--	--	--	--	--	1,652
Grant	331	--	--	--	--	--	--	--	--	--	--	--	77
Gray	4,729	--	121	--	--	--	--	--	--	--	--	--	165
Greeley	64	--	--	--	--	--	--	--	--	--	--	--	--
Hamilton	5,824	--	799	--	--	--	--	--	--	--	--	--	928
Harper	15,991	--	2,025	--	--	--	--	--	--	--	--	--	1,459
Harvey	4,100	--	642	--	--	--	--	--	--	--	--	--	758
Haskell	--	--	--	--	--	--	--	--	--	--	--	--	--
Hodgeman	--	--	--	--	--	--	--	--	--	--	--	--	--
Jewell	25,053	--	3,234	--	--	--	--	--	--	--	--	--	2,550
Kearny	1,100	--	--	--	--	--	--	--	--	--	--	--	--
Kingman	27,313	--	3,139	--	--	--	--	--	--	--	--	--	2,410
Kiowa	850	--	79	--	--	--	--	--	--	--	--	--	74
Lane	165	--	39	--	--	--	--	--	--	--	--	--	37
Lincoln	11,408	--	1,691	--	--	--	--	--	--	--	--	--	1,031
Logan	2,564	--	497	--	--	--	--	--	--	--	--	--	306
McPherson	16,099	--	1,932	--	--	--	--	--	--	--	--	--	998
Meade	5,462	--	496	--	--	--	--	--	--	--	--	--	356
Mitchell	25,013	--	4,064	--	--	--	--	--	--	--	--	--	2,837
Morton	5,120	--	736	--	--	--	--	--	--	--	--	--	633
Ness	1,520	--	381	--	--	--	--	--	--	--	--	--	171
Norton	7,736	--	1,556	--	--	--	--	--	--	--	--	--	1,149
Osborne	23,232	--	4,119	--	--	--	--	--	--	--	--	--	2,272
Ottawa	23,652	--	4,153	--	--	--	--	--	--	--	--	--	2,324
Pawnee	5,247	--	552	--	--	--	--	--	--	--	--	--	561
Phillips	17,710	--	2,360	--	--	--	--	--	--	--	--	--	2,036
Pratt	7,272	--	618	--	--	--	--	--	--	--	--	--	317
Rawlins	6,524	--	1,343	--	--	--	--	--	--	--	--	--	699
Reno	22,406	--	2,891	--	--	--	--	--	--	--	--	--	2,254
Republic	26,475	--	2,962	--	--	--	--	--	--	--	--	--	1,995
Rice	8,136	--	568	--	--	--	--	--	--	--	--	--	366
Rooks	23,373	--	3,188	--	--	--	--	--	--	--	--	--	2,240
Rush	329	--	79	--	--	--	--	--	--	--	--	--	74
Russell	17,278	--	2,649	--	--	--	--	--	--	--	--	--	1,245

(Table 51 continued on next page)

(Table 51 continued)

WESTERN UNIT

County	Species group								
	Cotton-wood	Bass-wood	Elm	Black walnut	Willow	Boxelder	Hackberry	Sycamore	Other hardwoods
Barber	15,259	--	415	192	473	386	1,827	30	454
Barton	1,719	--	77	40	112	102	393	--	93
Cheyenne	5,090	--	256	86	210	282	856	14	213
Clark	11,764	--	182	89	204	196	1,744	--	135
Cloud	20,618	--	1,111	517	628	759	2,588	114	842
Comanche	1,105	--	43	39	51	31	300	--	41
Decatur	3,156	--	158	69	195	174	684	8	182
Edwards	6,147	--	215	37	82	55	271	--	65
Ellis	4,165	--	192	106	271	218	811	8	220
Ellsworth	5,746	--	284	129	216	296	1,055	45	303
Finney	258	--	13	--	14	5	161	--	11
Ford	638	--	33	31	35	13	114	--	27
Gove	300	--	10	8	16	18	56	--	14
Graham	7,992	--	377	168	368	354	1,300	37	378
Grant	239	--	--	15	--	--	--	--	--
Gray	4,176	--	20	--	21	8	202	--	16
Greeley	64	--	--	--	--	--	--	--	--
Hamilton	2,482	--	122	27	156	80	1,119	--	111
Harper	9,683	--	385	253	425	342	1,043	46	330
Harvey	1,958	--	105	31	113	43	365	--	85
Haskell	--	--	--	--	--	--	--	--	--
Hodgeman	--	--	--	--	--	--	--	--	--
Jewell	12,891	--	462	194	619	379	4,259	8	457
Kearny	703	--	--	--	--	--	397	--	--
Kingman	17,522	--	732	561	684	441	1,162	114	548
Kiowa	415	--	13	--	14	5	239	--	11
Lane	45	--	6	--	7	3	23	--	5
Lincoln	6,612	--	258	147	249	284	884	15	237
Logan	1,218	--	68	32	79	56	229	7	72
McPherson	10,841	--	331	153	263	320	966	23	272
Meade	3,490	--	86	43	100	83	736	--	72
Mitchell	13,858	--	587	459	480	428	1,548	135	617
Morton	2,415	--	117	38	164	81	829	--	107
Ness	674	--	45	20	16	29	115	15	54
Norton	3,343	--	215	76	236	154	776	15	216
Osborne	12,841	--	510	238	446	421	1,718	88	579
Ottawa	12,643	--	569	407	570	429	1,778	134	645
Pawnee	2,997	--	77	46	93	59	788	--	74
Phillips	10,058	--	384	301	540	374	1,279	15	363
Pratt	5,532	--	121	41	101	100	357	--	85
Rawlins	3,059	--	157	73	176	169	648	15	185
Reno	13,769	--	525	431	539	290	1,132	97	478
Republic	16,771	--	495	144	511	367	2,812	8	410
Rice	6,625	--	122	44	47	52	218	15	79
Rooks	14,395	--	465	239	418	362	1,538	67	461
Rush	88	--	13	--	14	5	45	--	11
Russell	10,372	--	374	159	319	342	1,414	37	367

(Table 51 continued on next page)

(Table 51 continued)

WESTERN UNIT

County	All species	Species group: Eastern redcedar	Bur oak	Select white oak	Other white oak	Select red oak	Other red oak	Select hickory	Other hickory	Pecan	Hard maple	Soft maple	Ash
Saline	11,252	--	2,194	--	--	--	--	--	--	--	--	--	1,194
Scott	478	--	140	--	--	--	--	--	--	--	--	--	65
Sedgwick	24,861	--	4,393	--	--	--	--	--	--	236	--	--	2,724
Seward	6,722	--	833	--	--	--	--	--	--	--	--	--	531
Sheridan	4,337	--	662	--	--	--	--	--	--	--	--	--	351
Sherman	--	--	--	--	--	--	--	--	--	--	--	--	--
Smith	10,516	--	1,881	--	--	--	--	--	--	--	--	--	1,182
Stafford	17,554	--	603	--	--	--	--	--	--	--	--	--	500
Stanton	33	--	--	--	--	--	--	--	--	--	--	--	--
Stevens	1,800	--	364	--	--	--	--	--	--	--	--	--	231
Sumner	59,976	--	8,970	--	--	--	--	--	--	524	--	--	4,329
Thomas	2,184	--	102	--	--	--	--	--	--	--	--	--	40
Trego	4,218	--	683	--	--	--	--	--	--	--	--	--	594
Wallace	301	--	--	--	--	--	--	--	--	--	--	--	77
Wichita	--	--	--	--	--	--	--	--	--	--	--	--	--
All counties	630,070	--	89,091	--	--	--	--	--	--	760	--	--	56,557
All units	2,566,229	10,871	286,120	107,383	36,531	183,457	118,665	43,047	24,649	28,043	6,280	87,834	185,760

(Table 51 continued)

(Table 51 continued)

WESTERN UNIT

County	Species group: Cotton-wood	Bass-wood	Elm	Black walnut	Willow	Boxelder	Hackberry	Sycamore	Other hardwoods
Saline	5,630	--	323	177	218	246	918	46	306
Scott	186	--	18	6	--	5	30	8	20
Sedgwick	13,145	--	617	476	514	376	1,521	173	686
Seward	3,999	--	144	88	192	189	620	--	126
Sheridan	2,580	--	82	48	105	89	317	8	95
Sherman	--	--	--	--	--	--	--	--	--
Smith	5,156	--	235	86	314	247	1,159	--	256
Stafford	15,612	--	177	62	100	84	334	--	82
Stanton	33	--	--	--	--	--	--	--	--
Stevens	784	--	46	16	61	47	202	--	49
Sumner	37,459	--	2,006	717	491	888	2,968	342	1,282
Thomas	1,921	--	10	8	16	18	55	--	14
Trego	2,150	--	99	78	83	54	351	23	103
Wallace	208	--	--	16	--	--	--	--	--
Wichita	--	--	--	--	--	--	--	--	--
All counties	374,599	--	14,487	7,461	12,369	10,838	49,254	1,710	12,944
All units	610,060	25,763	69,531	169,979	47,901	22,839	299,581	105,631	96,304

Table 52.--Net volume of growing stock on commercial forest land by species group and diameter class, Kansas, 1981

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS													
Eastern redcedar	4,591	1,439	1,215	477	839	324	96	65	136	--	--	--	--
Total	4,591	1,439	1,215	477	839	324	96	65	136	--	--	--	--
HARDWOODS													
Bur oak	60,920	2,198	2,324	3,154	2,604	3,405	5,089	6,032	6,287	6,816	14,098	7,866	1,047
Select white oak	34,121	3,307	4,442	5,893	4,970	3,837	3,537	2,306	1,953	1,115	2,167	594	--
Other white oak	19,854	4,750	4,281	4,011	1,742	2,316	1,308	944	157	196	149	--	--
Select red oak	45,828	1,941	4,117	5,293	6,283	3,784	5,274	4,211	4,274	1,959	5,859	2,421	412
Other red oak	27,445	1,576	2,374	2,814	2,622	2,701	2,195	2,451	2,626	2,554	3,898	1,541	93
Select hickory	17,388	3,214	3,457	2,915	1,943	2,259	1,378	1,517	411	89	205	--	--
Other hickory	11,693	2,491	2,589	2,806	1,440	1,159	312	373	348	175	--	--	--
Pecan	8,986	488	1,004	1,785	1,337	973	909	473	397	751	385	484	--
Hard maple	3,120	484	928	538	459	279	49	43	99	113	--	128	--
Soft maple	21,011	485	1,432	1,263	1,223	2,418	2,280	2,252	1,912	1,684	3,312	1,555	1,195
Ash	61,700	6,832	10,408	9,328	5,756	6,807	5,240	5,475	3,276	2,333	5,709	536	--
Cottonwood	134,292	2,596	4,036	9,107	10,066	12,328	11,475	9,290	10,605	5,880	24,423	20,287	14,199
Basswood	6,031	399	392	587	1,084	1,111	769	592	292	510	179	--	116
Elm	30,599	6,595	5,638	4,192	2,243	2,720	1,645	1,437	1,242	1,284	2,577	942	84
Black walnut	57,868	8,104	6,807	10,891	9,541	8,487	6,036	3,835	1,536	1,596	574	461	--
Willow	11,629	509	882	984	1,729	1,996	1,653	1,424	1,022	553	757	--	120
Boxelder	10,376	1,836	2,027	1,495	1,890	1,081	713	771	258	222	83	--	--
Hackberry	86,674	8,452	9,246	10,782	10,624	10,137	10,498	7,995	5,698	4,246	5,800	3,196	--
Sycamore	21,538	213	619	634	1,129	1,190	2,530	1,695	1,580	2,268	3,750	4,139	1,791
Other hardwoods	35,651	5,167	5,521	5,180	4,759	3,970	3,527	3,153	1,672	1,215	869	618	--
Total	706,724	61,637	72,524	83,652	73,444	72,958	66,417	56,269	45,645	35,559	74,794	44,768	19,057
All species	711,315	63,076	73,739	84,129	74,283	73,282	66,513	56,334	45,781	35,559	74,794	44,768	19,057

Table 53.--Net volume of sawtimber on commercial forest land by species group and diameter class, Kansas, 1981

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS											
Eastern redcedar	10,871	2,652	4,643	1,878	570	396	732	--	--	--	--
Total	10,871	2,652	4,643	1,878	570	396	732	--	--	--	--
HARDWOODS											
Bur oak	286,120	--	15,105	19,451	29,982	33,074	32,861	38,333	74,977	36,996	5,341
Select white oak	107,383	--	28,207	20,572	19,392	11,728	9,392	5,574	10,042	2,476	--
Other white oak	36,531	--	9,331	12,588	7,023	4,829	919	1,008	833	--	--
Select red oak	183,457	--	34,179	21,851	29,427	28,500	25,576	9,396	24,613	8,358	1,557
Other red oak	118,665	--	14,479	14,714	12,599	14,698	15,601	15,454	22,966	7,613	541
Select hickory	43,047	--	11,086	12,107	7,457	8,251	2,565	512	1,069	--	--
Other hickory	24,649	--	7,608	6,463	1,797	6,131	1,750	900	--	--	--
Pecan	28,043	--	7,187	4,722	4,398	2,471	1,885	3,412	1,565	2,403	--
Hard maple	6,280	--	2,572	1,442	399	196	479	510	--	682	--
Soft maple	87,834	--	5,149	13,036	11,635	11,876	10,378	8,203	16,775	6,305	4,477
Ash	185,760	--	29,445	36,821	29,065	30,050	17,417	11,779	29,130	2,053	--
Cottonwood	610,060	--	47,920	64,973	58,306	51,036	56,304	30,916	130,159	106,157	64,289
Basswood	25,763	--	5,949	5,938	4,077	3,481	1,822	3,087	1,110	--	299
Elm	69,531	--	10,734	14,458	8,287	6,784	5,892	6,816	11,866	4,188	506
Black walnut	169,979	--	51,197	45,359	32,738	20,232	7,497	8,302	3,188	1,466	--
Willow	47,901	--	8,763	10,110	8,234	8,262	5,535	2,651	3,706	--	640
Boxelder	22,839	--	8,390	5,347	3,667	2,896	1,257	1,065	217	--	--
Hackberry	299,581	--	60,494	52,628	54,700	40,550	29,835	22,716	27,210	11,448	--
Sycamore	105,631	--	5,564	6,357	15,469	8,786	8,967	12,463	20,119	19,769	8,137
Other hardwoods	96,304	--	22,973	19,744	16,999	15,093	8,712	5,916	4,213	2,654	--
Total	2,555,358	--	386,332	388,681	355,651	308,924	244,644	189,013	383,758	212,568	85,787
All species	2,566,229	2,652	390,975	390,559	356,221	309,320	245,376	189,013	383,758	212,568	85,787

[1/] International 1/4-inch rule.

Table 54.--Net volume of growing stock on commercial forest land by species group and forest type, Kansas, 1981

(In thousand cubic feet)

Species	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
SOFTWOODS											
Eastern redcedar	4,591	2,592	617	--	292	98	--	--	215	625	152
Total	4,591	2,592	617	--	292	98	--	--	215	625	152
HARDWOODS											
Bur oak	60,920	171	29,078	381	3,613	4,874	--	--	22,347	393	63
Select white oak	34,121	791	29,061	65	708	1,745	--	--	1,366	385	--
Other white oak	19,854	157	6,135	13,166	331	--	--	--	--	65	--
Select red oak	45,828	80	36,845	979	815	2,291	--	--	3,435	1,383	--
Other red oak	27,445	--	22,561	1,684	365	1,233	34	--	1,084	431	53
Select hickory	17,388	94	13,249	302	212	1,609	--	--	1,305	617	--
Other hickory	11,693	--	6,029	165	584	1,140	--	--	3,640	135	--
Pecan	8,986	--	7,408	--	123	1,053	--	--	235	167	--
Hard maple	3,120	--	1,403	--	--	1,117	--	--	212	388	--
Soft maple	21,011	--	330	--	--	15,591	67	--	4,845	178	--
Ash	61,700	--	6,647	--	618	39,901	1,493	206	10,998	1,633	204
Cottonwood	134,292	--	1,556	--	640	34,107	90,065	383	5,166	1,675	700
Basswood	6,031	--	2,883	--	1,442	485	126	--	468	627	--
Elm	30,599	130	5,119	--	1,274	11,901	654	--	7,901	3,235	385
Black walnut	57,868	580	11,689	206	6,286	5,315	408	--	30,528	2,747	109
Willow	11,629	--	306	--	53	9,065	913	567	465	141	119
Boxelder	10,376	--	210	--	200	7,007	360	--	2,477	69	53
Hackberry	86,674	59	6,085	68	4,728	13,207	346	--	60,377	1,423	381
Sycamore	21,538	--	2,751	--	279	7,551	242	--	9,915	723	77
Other hardwoods	35,651	91	3,729	125	1,578	13,339	457	--	11,763	4,078	491
Total	706,724	2,153	193,074	17,141	23,849	172,531	95,165	1,156	178,527	20,493	2,635
All species	711,315	4,745	193,691	17,141	24,141	172,629	95,165	1,156	178,742	21,118	2,787

Table 55.--Net volume of sawtimber on commercial forest land by species group and forest type, Kansas, 1981

(In thousand board feet)[1/]

Species	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
SOFTWOODS											
Eastern redcedar	10,871	7,523	1,649	--	--	--	--	--	360	958	381
Total	10,871	7,523	1,649	--	--	--	--	--	360	958	381
HARDWOODS											
Bur oak	286,120	571	126,292	--	14,353	25,761	--	--	117,449	1,694	--
Select white oak	107,383	3,423	86,530	339	1,721	6,867	--	--	7,072	1,431	--
Other white oak	36,531	301	11,969	22,290	1,599	--	--	--	--	372	--
Select red oak	183,457	--	149,217	2,739	3,093	11,105	--	--	13,024	4,279	--
Other red oak	118,665	--	103,150	2,589	1,578	4,332	--	--	5,085	1,593	338
Select hickory	43,047	--	29,052	1,427	1,004	7,077	--	--	3,105	1,382	--
Other hickory	24,649	--	12,535	--	--	3,760	--	--	8,025	329	--
Pecan	28,043	--	22,543	--	--	4,105	--	--	760	635	--
Hard maple	6,280	--	3,110	--	--	2,182	--	--	--	988	--
Soft maple	87,834	--	2,030	--	--	65,063	335	--	20,119	287	--
Ash	185,760	--	16,443	--	1,473	118,802	2,463	369	43,785	1,623	802
Cottonwood	610,060	--	6,366	--	3,395	164,607	399,810	1,812	25,580	5,816	2,674
Basswood	25,763	--	11,756	--	6,659	2,638	--	--	1,579	3,131	--
Elm	69,531	342	10,158	--	2,544	27,533	1,447	--	21,838	4,879	790
Black walnut	169,979	1,061	32,578	--	14,329	14,742	523	--	99,584	7,162	--
Willow	47,901	--	698	--	--	40,355	2,415	1,941	1,363	466	663
Boxelder	22,839	--	589	--	886	12,052	806	--	8,506	--	--
Hackberry	299,581	--	18,596	346	13,711	39,479	1,304	--	222,890	2,627	628
Sycamore	105,631	--	12,700	--	1,232	38,961	904	--	48,446	3,043	345
Other hardwoods	96,304	--	11,222	302	3,165	36,662	205	--	33,076	11,299	373
Total	2,555,358	5,698	667,534	30,032	70,742	626,083	410,212	4,122	681,286	53,036	6,613
All species	2,566,229	13,221	669,183	30,032	70,742	626,083	410,212	4,122	681,646	53,994	6,994

[1/] International 1/4-inch rule.

Table 56.--Net volume of growing stock on commercial forest land by species group and ownership class, Kansas, 1981

(In thousand cubic feet)

Species group	All classes	Ownership class						
		National forest	Misc. federal	Indian	State	County and municipal	Farmer	Misc. private
SOFTWOODS								
Eastern redcedar	4,591	--	52	--	--	--	3,289	1,250
Total	4,591	--	52	--	--	--	3,289	1,250
HARDWOODS								
Bur oak	60,920	--	1,237	--	282	--	38,563	20,838
Select white oak	34,121	--	978	--	--	200	18,816	14,127
Other white oak	19,854	--	731	--	--	--	14,227	4,896
Select red oak	45,828	--	1,049	--	--	--	27,348	17,431
Other red oak	27,445	--	123	--	3,041	--	15,875	8,406
Select hickory	17,388	--	616	--	114	--	8,230	8,428
Other hickory	11,693	--	450	--	--	--	6,696	4,547
Pecan	8,986	--	--	--	91	--	3,444	5,451
Hard maple	3,120	--	--	--	--	--	737	2,383
Soft maple	21,011	--	749	--	1,566	659	11,177	6,860
Ash	61,700	--	1,523	--	941	--	40,475	18,761
Cottonwood	134,292	--	9,794	398	2,130	--	73,053	48,917
Basswood	6,031	--	98	--	--	--	3,943	1,990
Elm	30,599	--	1,192	58	139	130	17,944	11,136
Black walnut	57,868	--	2,229	--	66	223	36,723	18,627
Willow	11,629	--	232	--	32	443	7,763	3,159
Boxelder	10,376	--	95	--	--	200	7,379	2,702
Hackberry	86,674	--	3,628	180	92	990	55,798	25,986
Sycamore	21,538	--	1,608	--	--	--	15,703	4,227
Other hardwoods	35,651	--	1,520	398	246	432	19,981	13,074
Total	706,724	--	27,852	1,034	8,740	3,277	423,875	241,946
All species	711,315	--	27,904	1,034	8,740	3,277	427,164	243,196

Table 57.--Net volume of sawtimber on commercial forest land by species group and ownership class, Kansas, 1981

(In thousand board feet)[1/]

Species group	All classes	Ownership class						
		National forest	Misc. federal	Indian	State	County and municipal	Farmer	Misc. private
SOFTWOODS								
Eastern redcedar	10,871	--	--	--	--	--	9,115	1,756
Total	10,871	--	--	--	--	--	9,115	1,756
HARDWOODS								
Bur oak	286,120	--	5,909	--	1,271	--	180,540	98,400
Select white oak	107,383	--	3,014	--	--	--	65,965	38,404
Other white oak	36,531	--	1,902	--	--	--	25,810	8,819
Select red oak	183,457	--	4,751	--	--	--	105,393	73,313
Other red oak	118,665	--	--	--	18,519	--	69,966	30,180
Select hickory	43,047	--	425	--	286	--	21,144	21,192
Other hickory	24,649	--	--	--	--	--	14,218	10,431
Pecan	28,043	--	--	--	541	--	12,991	14,511
Hard maple	6,280	--	--	--	--	--	1,617	4,663
Soft maple	87,834	--	2,936	--	8,597	2,004	44,993	29,304
Ash	185,760	--	4,073	--	4,798	--	118,314	58,575
Cottonwood	610,060	--	55,081	862	--	--	336,232	217,885
Basswood	25,763	--	487	--	--	--	17,069	8,207
Elm	69,531	--	2,022	--	--	628	43,595	23,286
Black walnut	169,979	--	9,998	--	342	628	107,965	51,046
Willow	47,901	--	831	--	--	2,064	31,674	13,332
Boxelder	22,839	--	--	--	--	886	16,780	5,173
Hackberry	299,581	--	9,875	315	471	2,492	192,875	93,553
Sycamore	105,631	--	9,068	--	--	--	77,423	19,140
Other hardwoods	96,304	--	5,351	1,513	1,591	1,970	49,455	36,424
Total	2,555,358	--	115,723	2,690	36,416	10,672	1,534,019	855,838
All species	2,566,229	--	115,723	2,690	36,416	10,672	1,543,134	857,594

[1/] International 1/4-inch rule.

Table 58.--Net volume of growing stock on commercial forest land by forest type and stand-age class, Kansas, 1981

(In thousand cubic feet)

Forest type	All classes	Stand-age class (years)												
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Eastern redcedar-hardwood	4,745	1,271	466	--	589	--	1,249	--	--	--	--	--	1,170	--
Oak-hickory	193,691	8,406	8,315	8,768	13,044	18,005	20,214	24,112	25,032	13,084	23,229	19,842	9,680	1,960
Post-blackjack oak	17,141	190	85	338	2,483	7,975	711	348	2,130	2,125	--	756	--	--
Upland plains hardwoods	24,141	948	2,763	2,129	2,378	2,581	3,690	5,711	940	877	--	444	1,680	--
Elm-ash-cottonwood	172,629	6,963	11,248	5,593	11,614	9,464	36,007	28,026	27,281	19,496	8,459	8,478	--	--
Cottonwood	95,165	135	71	1,693	3,632	13,005	10,609	25,472	11,615	5,226	14,536	9,171	--	--
Willow	1,156	--	761	270	--	--	125	--	--	--	--	--	--	--
Lowland plains hardwoods	178,742	4,557	5,943	4,743	14,929	6,007	28,804	36,095	36,442	14,175	15,397	9,505	675	1,470
Upland elm-ash-locust	21,118	3,006	4,162	1,578	2,854	579	1,165	1,970	1,677	1,504	1,142	447	1,034	--
Nonstocked	2,787	415	322	471	295	--	842	119	280	43	--	--	--	--
All types	711,315	25,891	34,136	25,583	51,818	57,616	103,416	121,853	105,397	56,530	62,763	48,643	14,239	3,430

Table 59.--Net volume of sawtimber on commercial forest land by forest type and stand-age class, Kansas, 1981

(In thousand board feet)[1/]

Forest type	All classes	Stand-age class (years)												
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Eastern redcedar-hardwood	13,221	2,209	876	--	1,018	--	4,308	--	--	--	--	--	4,810	--
Oak-hickory	669,183	29,466	25,406	17,915	23,341	37,797	44,030	87,036	99,907	57,366	104,212	90,533	42,054	10,120
Post-blackjack oak	30,032	517	--	--	1,222	6,406	1,653	1,071	8,419	7,290	--	3,454	--	--
Upland plains hardwoods	70,742	767	4,978	3,868	4,176	4,392	14,329	23,320	4,463	3,394	--	1,335	5,720	--
Elm-ash-cottonwood	626,083	23,616	21,854	11,796	19,671	29,745	135,753	112,108	110,092	77,025	44,050	40,373	--	--
Cottonwood	410,212	--	347	858	3,501	49,285	41,419	111,005	56,173	18,276	79,571	49,777	--	--
Willow	4,122	--	3,144	328	--	--	650	--	--	--	--	--	--	--
Lowland plains hardwoods	681,646	23,175	16,300	10,063	31,936	19,683	100,032	146,369	156,923	59,789	65,684	40,680	3,271	7,741
Upland elm-ash-locust	53,994	6,924	7,884	2,881	6,281	1,389	4,106	7,442	4,829	4,215	3,476	1,877	2,690	--
Nonstocked	6,994	1,410	514	337	373	--	2,513	663	968	216	--	--	--	--
All types	2,566,229	88,084	81,303	48,046	91,519	148,697	348,793	489,014	441,774	227,571	296,993	228,029	58,545	17,861

[1/] International 1/4-inch rule.

Table 60.--Net volume of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Kansas, 1981

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Eastern redcedar-hardwood															
Sawtimber	1,870	--	--	--	--	--	--	--	--	--	--	1,870	--	--	--
Poletimber	1,138	--	--	--	--	--	--	589	549	--	--	--	--	--	--
Sapling & seedling	1,737	32	133	--	532	747	293	--	--	--	--	--	--	--	--
All stands	4,745	32	133	--	532	747	293	589	549	--	--	1,870	--	--	--
Oak-hickory															
Sawtimber	116,700	--	--	277	1,220	8,219	7,987	19,731	13,943	15,803	21,678	19,380	8,462	--	--
Poletimber	57,675	--	--	--	315	1,494	4,337	9,117	12,038	5,511	5,420	15,255	4,188	--	--
Sapling & seedling	19,316	50	1,059	702	6,135	4,367	1,919	1,780	1,698	992	614	--	--	--	--
All stands	193,691	50	1,059	979	7,670	14,080	14,243	30,628	27,679	22,306	27,712	34,635	12,650	--	--
Post-blackjack oak															
Sawtimber	4,329	--	--	442	--	--	348	1,156	1,438	945	--	--	--	--	--
Poletimber	11,805	--	--	--	--	--	--	--	2,492	953	4,040	2,661	1,659	--	--
Sapling & seedling	1,007	--	--	85	--	--	137	190	--	--	595	--	--	--	--
All stands	17,141	--	--	527	--	--	485	1,346	3,930	1,898	4,635	2,661	1,659	--	--
Upland plains hardwoods															
Sawtimber	12,942	--	--	--	425	1,437	649	1,821	2,075	3,021	1,562	--	1,952	--	--
Poletimber	8,384	--	--	148	--	563	1,677	1,178	379	896	2,220	1,323	--	--	--
Sapling & seedling	2,815	--	--	401	420	708	--	565	293	428	--	--	--	--	--
All stands	24,141	--	--	549	845	2,708	2,326	3,564	2,747	4,345	3,782	1,323	1,952	--	--
Elm-ash-cottonwood															
Sawtimber	128,904	--	260	1,342	2,960	7,752	6,741	12,361	14,166	4,976	11,827	29,083	23,239	14,197	--
Poletimber	25,595	--	--	567	--	965	3,058	3,908	2,611	5,801	2,089	5,894	702	--	--
Sapling & seedling	18,130	79	518	1,182	4,405	6,210	2,494	1,138	853	108	1,143	--	--	--	--
All stands	172,629	79	778	3,091	7,365	14,927	12,293	17,407	17,630	10,885	15,059	34,977	23,941	14,197	--
Cottonwood															
Sawtimber	89,787	--	153	661	478	3,153	5,217	1,106	10,047	1,779	6,722	12,604	26,647	9,885	11,335
Poletimber	4,175	--	--	--	--	--	697	--	1,317	--	2,161	--	--	--	--
Sapling & seedling	1,203	--	71	--	135	--	--	--	--	--	997	--	--	--	--
All stands	95,165	--	224	661	613	3,153	5,914	1,106	11,364	1,779	9,880	12,604	26,647	9,885	11,335

(Table 60 continued on next page)

(Table 60 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Willow															
Sawtimber	125	--	--	--	--	--	--	--	--	--	--	125	--	--	--
Poletimber	270	--	--	--	270	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	761	--	--	--	--	--	761	--	--	--	--	--	--	--	--
All stands	1,156	--	--	--	270	--	761	--	--	--	--	125	--	--	--
Lowland plains hardwoods															
Sawtimber	142,626	--	--	--	4,919	6,790	7,161	17,118	19,043	17,642	22,897	32,283	14,773	--	--
Poletimber	25,156	--	342	401	530	--	2,794	3,723	6,051	760	4,880	5,675	--	--	--
Sapling & seedling	10,960	--	417	1,012	2,241	1,889	784	2,880	1,737	--	--	--	--	--	--
All stands	178,742	--	759	1,413	7,690	8,679	10,739	23,721	26,831	18,402	27,777	37,958	14,773	--	--
Upland elm-ash-locust															
Sawtimber	8,765	--	--	114	879	363	--	2,441	1,757	2,450	761	--	--	--	--
Poletimber	4,371	--	--	--	265	--	260	1,862	469	--	809	706	--	--	--
Sapling & seedling	7,982	50	1,332	589	1,278	1,555	925	855	867	--	531	--	--	--	--
All stands	21,118	50	1,332	703	2,422	1,918	1,185	5,158	3,093	2,450	2,101	706	--	--	--
Nonstocked	2,787	50	853	167	494	845	316	62	--	--	--	--	--	--	--
All types															
Sawtimber	506,048	--	413	2,836	10,881	27,714	28,103	55,734	62,469	46,616	65,447	95,345	75,073	24,082	11,335
Poletimber	138,569	--	342	1,116	1,380	3,022	12,823	20,377	25,906	13,921	21,619	31,514	6,549	--	--
Sapling & seedling	63,911	211	3,530	3,971	15,146	15,476	7,313	7,408	5,448	1,528	3,880	--	--	--	--
Nonstocked	2,787	50	853	167	494	845	316	62	--	--	--	--	--	--	--
All stands	711,315	261	5,138	8,090	27,901	47,057	48,555	83,581	93,823	62,065	90,946	126,859	81,622	24,082	11,335

Table 61.--Net volume of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Kansas, 1981

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Eastern redcedar-hardwood															
Sawtimber	7,551	--	--	--	--	--	--	--	--	--	--	7,551	--	--	--
Poletimber	2,585	--	--	--	--	--	--	1,018	1,567	--	--	--	--	--	--
Sapling & seedling	3,085	--	--	--	1,298	1,471	316	--	--	--	--	--	--	--	--
All stands	13,221	--	--	--	1,298	1,471	316	1,018	1,567	--	--	7,551	--	--	--
Oak-hickory															
Sawtimber	502,737	--	--	1,050	5,534	39,096	32,298	90,535	48,094	69,043	93,971	85,432	37,684	--	--
Poletimber	105,294	--	--	--	--	2,714	5,899	14,888	25,228	8,762	11,698	31,041	5,064	--	--
Sapling & seedling	61,152	--	3,847	2,102	18,542	16,111	4,677	5,796	6,497	1,489	2,091	--	--	--	--
All stands	669,183	--	3,847	3,152	24,076	57,921	42,874	111,219	79,819	79,294	107,760	116,473	42,748	--	--
Post-blackjack oak															
Sawtimber	16,894	--	--	2,867	--	--	1,071	3,522	5,805	3,629	--	--	--	--	--
Poletimber	12,466	--	--	--	--	--	--	--	3,301	1,598	6,275	1,292	--	--	--
Sapling & seedling	672	--	--	--	--	--	155	517	--	--	--	--	--	--	--
All stands	30,032	--	--	2,867	--	--	1,226	4,039	9,106	5,227	6,275	1,292	--	--	--
Upland plains hardwoods															
Sawtimber	51,615	--	--	--	2,251	6,023	1,966	7,783	7,644	11,715	8,257	--	5,976	--	--
Poletimber	15,166	--	--	--	--	1,407	3,181	1,868	--	1,784	4,513	2,413	--	--	--
Sapling & seedling	3,961	--	--	--	2,024	473	--	--	294	1,170	--	--	--	--	--
All stands	70,742	--	--	--	4,275	7,903	5,147	9,651	7,938	14,669	12,770	2,413	5,976	--	--
Elm-ash-cottonwood															
Sawtimber	529,475	--	1,009	6,911	12,522	29,764	32,633	48,100	59,250	18,447	42,297	129,997	90,325	58,220	--
Poletimber	48,220	--	--	1,235	--	1,319	5,837	9,993	6,343	6,738	4,619	10,602	1,534	--	--
Sapling & seedling	48,388	522	1,258	3,608	10,344	14,628	9,053	2,458	735	225	5,557	--	--	--	--
All stands	626,083	522	2,267	11,754	22,866	45,711	47,523	60,551	66,328	25,410	52,473	140,599	91,859	58,220	--
Cottonwood															
Sawtimber	406,054	--	548	2,152	1,624	11,869	26,627	4,744	37,663	8,722	39,360	49,792	123,350	49,003	50,600
Poletimber	3,507	--	--	--	--	--	554	--	2,953	--	--	--	--	--	--
Sapling & seedling	651	--	347	--	--	--	--	--	--	--	304	--	--	--	--
All stands	410,212	--	895	2,152	1,624	11,869	27,181	4,744	40,616	8,722	39,664	49,792	123,350	49,003	50,600

(Table 61 continued on next page)

[1/] International 1/4-inch rule.

(Table 61 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Willow															
Sawtimber	650	--	--	--	--	--	--	--	--	--	--	650	--	--	--
Poletimber	328	--	--	--	328	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	3,144	--	--	--	--	--	3,144	--	--	--	--	--	--	--	--
All stands	4,122	--	--	--	328	--	3,144	--	--	--	--	650	--	--	--
Lowland plains hardwood															
Sawtimber	593,421	--	--	--	20,821	28,066	32,332	68,809	82,310	68,893	96,574	133,375	62,241	--	--
Poletimber	46,369	--	--	337	504	--	2,809	8,551	10,447	1,701	10,832	11,188	--	--	--
Sapling & seedling	41,856	--	1,358	1,521	8,699	5,456	3,192	9,105	12,525	--	--	--	--	--	--
All stands	681,646	--	1,358	1,858	30,024	33,522	38,333	86,465	105,282	70,594	107,406	144,563	62,241	--	--
Upland elm-ash-locust															
Sawtimber	28,725	--	--	262	3,638	1,120	--	7,597	5,215	8,788	2,105	--	--	--	--
Poletimber	7,870	--	--	--	195	--	620	4,103	314	--	1,243	1,395	--	--	--
Sapling & seedling	17,399	--	2,593	1,760	3,124	5,106	2,373	750	935	--	758	--	--	--	--
All stands	53,994	--	2,593	2,022	6,957	6,226	2,993	12,450	6,464	8,788	4,106	1,395	--	--	--
Nonstocked	6,994	--	3,140	586	1,316	1,783	169	--	--	--	--	--	--	--	--
All types															
Sawtimber	2,137,122	--	1,557	13,242	46,390	115,938	126,927	231,090	245,981	189,237	282,564	406,797	319,576	107,223	50,600
Poletimber	241,805	--	--	1,572	1,027	5,440	18,900	40,421	50,153	20,583	39,180	57,931	6,598	--	--
Sapling & seedling	180,308	522	9,403	8,991	44,031	43,245	22,910	18,626	20,986	2,884	8,710	--	--	--	--
Nonstocked	6,994	--	3,140	586	1,316	1,783	169	--	--	--	--	--	--	--	--
All stands	2,566,229	522	14,100	24,391	92,764	166,406	168,906	290,137	317,120	212,704	330,454	464,728	326,174	107,223	50,600

Table 62.--Net volume of sawtimber on commercial forest land by species group and butt log-grade, Kansas, 1981

(In thousand board feet)[1/]

Species group	All grades	Log grade 1	2	3	Tie and timber
SOFTWOODS					
Eastern redcedar	10,871	--	--	9,288	1,583
Total	10,871	--	--	9,288	1,583
HARDWOODS					
Bur oak	286,120	62,314	83,866	125,690	14,250
Select white oak	107,383	15,773	31,101	57,630	2,879
Other white oak	36,531	1,511	11,996	22,451	573
Select red oak	183,457	42,611	58,851	77,067	4,928
Other red oak	118,665	16,741	40,147	52,680	9,097
Select hickory	43,047	7,461	16,724	17,213	1,649
Other hickory	24,649	3,698	11,719	8,127	1,105
Pecan	28,043	11,015	6,254	10,774	--
Hard maple	6,280	1,141	1,889	2,698	552
Soft maple	87,834	19,380	28,931	35,865	3,658
Ash	185,760	68,512	61,858	53,810	1,580
Cottonwood	610,060	326,242	136,913	136,314	10,591
Basswood	25,763	8,822	3,602	12,284	1,055
Elm	69,531	8,683	10,404	46,889	3,555
Black walnut	169,979	40,924	66,343	61,521	1,191
Willow	47,901	17,421	13,992	14,031	2,457
Boxelder	22,839	--	5,456	15,893	1,490
Hackberry	299,581	89,384	96,672	103,430	10,095
Sycamore	105,631	60,261	30,246	14,175	949
Other hardwoods	96,304	7,671	30,719	53,286	4,628
Total	2,555,358	809,565	747,683	921,828	76,282
All species	2,566,229	809,565	747,683	931,116	77,865

[1/] International 1/4-inch rule.

Table 63.--Net volume of growing-stock trees by forest type and ground land use, Kansas, 1981

(In thousand cubic feet)

Forest type	Ground land use				
	Pastured commercial forest	Unpastured commercial forest	Wooded strips	Windbreaks	Wooded pasture
Eastern redcedar-hardwood	1,262	3,483	16,881	--	1,449
Oak-hickory	48,040	145,651	2,309	--	3,939
Post-blackjack oak	6,669	10,472	--	--	--
Upland plains hardwoods	9,108	15,033	1,828	475	1,438
Elm-ash-cottonwood	27,954	144,675	36,157	--	6,318
Cottonwood	25,286	69,879	3,676	--	1,313
Willow	--	1,156	1,336	--	--
Lowland plains hardwoods	33,580	145,162	12,652	--	2,801
Upland elm-ash-locust	8,071	13,047	13,706	--	2,924
Nonstocked	1,421	1,366	2,998	--	3,247
All types	161,391	549,924	91,543	475	23,429

Table 64.--Net volume of black walnut, by land class and tree class, Kansas, 1981

Tree class	Commercial forest		Nonforest with trees			
			Wooded strips		Other nonforest with trees	
	Thousand cubic feet	Thousand board feet[1/]	Thousand cubic feet	Thousand board feet[1/]	Thousand cubic feet	Thousand board feet[1/]
Growing stock	57,868	--	3,368	--	2,133	--
Sawtimber	--	169,979	--	8,669	--	6,486
Short-log cull	5,495	13,121	685	991	573	909
Rough and rotten cull	5,384	--	487	--	755	--
All classes	68,747	183,100	4,540	9,660	3,461	7,395

[1/] International 1/4-inch rule.

Table 65.--Net volume of growing-stock and short-log trees on commercial forest land and wooded strips, by species group and Forest Survey Unit, Kansas, 1981

(In thousand cubic feet)

Species group	Total	Commercial forest land		Wooded strips	
		Growing-stock trees	Short-log trees	Growing-stock trees	Short-log trees
ALL UNITS					
SOFTWOODS					
Eastern redcedar	6,077	4,591	410	1,076	--
Total	6,077	4,591	410	1,076	--
HARDWOODS					
Bur oak	78,929	60,920	6,634	11,301	74
Select white oak	39,284	34,121	4,875	258	30
Other white oak	21,641	19,854	1,787	--	--
Select red oak	49,432	45,828	1,755	1,658	191
Other red oak	30,416	27,445	2,097	874	--
Select hickory	18,493	17,388	928	177	--
Other hickory	13,399	11,693	934	733	39
Pecan	10,665	8,986	757	798	124
Hard maple	3,245	3,120	125	--	--
Soft maple	25,042	21,011	1,078	2,953	--
Ash	80,493	61,700	5,446	11,082	2,265
Cottonwood	162,335	134,292	4,011	24,032	--
Basswood	7,109	6,031	734	344	--
Elm	44,980	30,599	8,010	5,154	1,217
Black walnut	67,416	57,868	5,495	3,368	685
Willow	14,014	11,629	821	1,475	89
Boxelder	17,609	10,376	3,487	2,174	1,572
Hackberry	109,599	86,674	9,118	12,710	1,097
Sycamore	26,445	21,538	250	4,657	--
Other hardwoods	52,671	35,651	8,677	6,719	1,624
Total	873,217	706,724	67,019	90,467	9,007
All species	879,294	711,315	67,429	91,543	9,007
NORTHEASTERN UNIT					
SOFTWOODS					
Eastern redcedar	2,851	2,446	225	180	--
Total	2,851	2,446	225	180	--
HARDWOODS					
Bur oak	34,479	29,902	3,708	869	--
Select white oak	25,682	22,050	3,602	--	30
Other white oak	2,315	2,107	208	--	--
Select red oak	26,738	25,577	911	250	--
Other red oak	16,583	15,385	788	410	--
Select hickory	12,395	11,801	430	164	--
Other hickory	7,690	6,665	719	267	39
Pecan	265	265	--	--	--
Hard maple	1,938	1,938	--	--	--
Soft maple	13,003	10,459	633	1,911	--
Ash	18,511	13,845	1,283	3,159	224
Cottonwood	48,389	43,561	1,017	3,811	--
Basswood	6,696	5,618	734	344	--
Elm	19,950	13,932	3,066	2,571	381
Black walnut	37,917	32,366	2,945	1,959	647
Willow	6,204	5,021	235	948	--
Boxelder	6,169	3,563	865	1,191	550
Hackberry	45,013	37,640	2,871	3,883	619
Sycamore	14,808	11,447	26	3,335	--
Other hardwoods	30,233	19,505	4,520	5,347	861
Total	374,978	312,647	28,561	30,419	3,351
All species	377,829	315,093	28,786	30,599	3,351

(Table 65 continued on next page)

(Table 65 continued)

Species group	Total	Commercial forest land		Wooded strips	
		Growing-stock trees	Short-log trees	Growing-stock trees	Short-log trees
SOUTHEASTERN UNIT					
SOFTWOODS					
Eastern redcedar	2,297	2,112	185	--	--
Total	2,297	2,112	185	--	--
HARDWOODS					
Bur oak	19,183	15,644	1,613	1,852	74
Select white oak	13,602	12,071	1,273	258	--
Other white oak	19,326	17,747	1,579	--	--
Select red oak	22,694	20,251	844	1,408	191
Other red oak	13,833	12,060	1,309	464	--
Select hickory	6,098	5,587	498	13	--
Other hickory	5,709	5,028	215	466	--
Pecan	10,257	8,578	757	798	124
Hard maple	1,307	1,182	125	--	--
Soft maple	11,912	10,552	318	1,042	--
Ash	30,634	26,734	1,759	1,232	909
Cottonwood	11,272	9,786	438	1,048	--
Basswood	413	413	--	--	--
Elm	19,065	12,589	3,150	2,490	836
Black walnut	26,920	23,004	2,469	1,409	38
Willow	4,860	4,204	284	283	89
Boxelder	4,114	1,831	708	983	592
Hackberry	45,226	38,441	2,275	4,328	182
Sycamore	11,333	9,787	224	1,322	--
Other hardwoods	15,694	11,527	2,032	1,372	763
Total	293,452	247,016	21,870	20,768	3,798
All species	295,749	249,128	22,055	20,768	3,798
WESTERN UNIT					
SOFTWOODS					
Eastern redcedar	929	33	--	896	--
Total	929	33	--	896	--
HARDWOODS					
Bur oak	25,267	15,374	1,313	8,580	--
Select white oak	--	--	--	--	--
Other white oak	--	--	--	--	--
Select red oak	--	--	--	--	--
Other red oak	--	--	--	--	--
Select hickory	--	--	--	--	--
Other hickory	--	--	--	--	--
Pecan	143	143	--	--	--
Hard maple	--	--	--	--	--
Soft maple	127	--	127	--	--
Ash	31,348	21,121	2,404	6,691	1,132
Cottonwood	102,674	80,945	2,556	19,173	--
Basswood	--	--	--	--	--
Elm	5,965	4,078	1,794	93	--
Black walnut	2,579	2,498	81	--	--
Willow	2,950	2,404	302	244	--
Boxelder	7,326	4,982	1,914	--	430
Hackberry	19,360	10,593	3,972	4,499	296
Sycamore	304	304	--	--	--
Other hardwoods	6,744	4,619	2,125	--	--
Total	204,787	147,061	16,588	39,280	1,858
All species	205,716	147,094	16,588	40,176	1,858

Table 66.--Net volume of sawtimber and short-log trees on commercial forest land and wooded strips, by species group and Forest Survey Unit, Kansas, 1981

(In thousand board feet)[1/]

Species group	Total	Commercial forest land		Wooded strips	
		Sawtimber trees	Short-log trees	Sawtimber trees	Short-log trees
ALL UNITS					
SOFTWOODS					
Eastern redcedar	12,870	10,871	779	1,220	--
Total	12,870	10,871	779	1,220	--
HARDWOODS					
Bur oak	350,299	286,120	16,080	48,099	--
Select white oak	119,652	107,383	12,269	--	--
Other white oak	38,525	36,531	1,994	--	--
Select red oak	192,823	183,457	4,733	4,633	--
Other red oak	128,529	118,665	6,328	3,536	--
Select hickory	44,878	43,047	1,831	--	--
Other hickory	27,293	24,649	1,685	959	--
Pecan	33,204	28,043	1,903	2,860	398
Hard maple	6,613	6,280	333	--	--
Soft maple	101,089	87,834	2,571	10,684	--
Ash	236,913	185,760	11,798	34,894	4,461
Cottonwood	707,410	610,060	13,704	83,646	--
Basswood	28,141	25,763	1,571	807	--
Elm	92,790	69,531	12,387	9,199	1,673
Black walnut	192,760	169,979	13,121	8,669	991
Willow	57,075	47,901	2,355	6,433	386
Boxelder	39,152	22,839	7,992	5,125	3,196
Hackberry	363,523	299,581	21,596	41,472	874
Sycamore	120,423	105,631	370	14,422	--
Other hardwoods	135,631	96,304	12,504	23,399	3,424
Total	3,016,723	2,555,358	147,125	298,837	15,403
All species	3,029,593	2,566,229	147,904	300,057	15,403
NORTHEASTERN UNIT					
SOFTWOODS					
Eastern redcedar	5,209	5,106	103	--	--
Total	5,209	5,106	103	--	--
HARDWOODS					
Bur oak	136,514	124,290	8,605	3,619	--
Select white oak	87,258	77,476	9,782	--	--
Other white oak	6,476	6,145	331	--	--
Select red oak	106,363	104,284	2,079	--	--
Other red oak	76,262	70,133	3,922	2,207	--
Select hickory	24,651	24,060	591	--	--
Other hickory	15,851	14,453	1,398	--	--
Pecan	575	575	--	--	--
Hard maple	3,635	3,635	--	--	--
Soft maple	53,320	44,464	1,384	7,472	--
Ash	57,355	42,154	2,698	12,186	317
Cottonwood	212,554	196,103	2,572	13,879	--
Basswood	27,185	24,807	1,571	807	--
Elm	33,538	25,507	3,148	4,536	347
Black walnut	111,345	96,526	8,285	5,543	991
Willow	23,260	19,065	257	3,938	--
Boxelder	9,787	5,924	1,818	1,129	916
Hackberry	133,687	112,814	8,586	11,413	874
Sycamore	64,790	56,268	--	8,522	--
Other hardwoods	81,192	53,824	6,979	18,801	1,588
Total	1,265,598	1,102,507	64,006	94,052	5,033
All species	1,270,807	1,107,613	64,109	94,052	5,033

(Table 66 continued on next page)

[1/] International 1/4-inch rule.

(Table 66 continued)

Species group	Total	Commercial forest land		Wooded strips	
		Growing-stock trees	Short-log trees	Growing-stock trees	Short-log trees
SOUTHEASTERN UNIT					
SOFTWOODS					
Eastern redcedar	6,441	5,765	676	--	--
Total	6,441	5,765	676	--	--
HARDWOODS					
Bur oak	83,901	72,739	3,331	7,831	--
Select white oak	32,394	29,907	2,487	--	--
Other white oak	32,049	30,386	1,663	--	--
Select red oak	86,460	79,173	2,654	4,633	--
Other red oak	52,267	48,532	2,406	1,329	--
Select hickory	20,227	18,987	1,240	--	--
Other hickory	11,442	10,196	287	959	--
Pecan	31,869	26,708	1,903	2,860	398
Hard maple	2,978	2,645	333	--	--
Soft maple	47,363	43,370	781	3,212	--
Ash	96,218	87,049	3,406	3,867	1,896
Cottonwood	45,351	39,358	1,244	4,749	--
Basswood	956	956	--	--	--
Elm	40,542	29,537	5,016	4,663	1,326
Black walnut	73,954	65,992	4,836	3,126	--
Willow	18,858	16,467	637	1,368	386
Boxelder	13,231	6,077	1,488	3,996	1,670
Hackberry	158,074	137,513	5,239	15,322	--
Sycamore	53,923	47,653	370	5,900	--
Other hardwoods	38,647	29,536	2,677	4,598	1,836
Total	940,704	822,781	41,998	68,413	7,512
All species	947,145	828,546	42,674	68,413	7,512
WESTERN UNIT					
SOFTWOODS					
Eastern redcedar	1,220	--	--	1,220	--
Total	1,220	--	--	1,220	--
HARDWOODS					
Bur oak	129,884	89,091	4,144	36,649	--
Select white oak	--	--	--	--	--
Other white oak	--	--	--	--	--
Select red oak	--	--	--	--	--
Other red oak	--	--	--	--	--
Select hickory	--	--	--	--	--
Other hickory	--	--	--	--	--
Pecan	760	760	--	--	--
Hard maple	--	--	--	--	--
Soft maple	406	--	406	--	--
Ash	83,340	56,557	5,694	18,841	2,248
Cottonwood	449,505	374,599	9,888	65,018	--
Basswood	--	--	--	--	--
Elm	18,710	14,487	4,223	--	--
Black walnut	7,461	7,461	--	--	--
Willow	14,957	12,369	1,461	1,127	--
Boxelder	16,134	10,838	4,686	--	610
Hackberry	71,762	49,254	7,771	14,737	--
Sycamore	1,710	1,710	--	--	--
Other hardwoods	15,792	12,944	2,848	--	--
Total	810,421	630,070	41,121	136,372	2,858
All species	811,641	630,070	41,121	137,592	2,858

Table 67.--Net volume of short-log trees on commercial forest land by species group and diameter class, Kansas, 1981

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS													
Eastern redcedar	410	97	176	25	--	85	27	--	--	--	--	--	--
Total	410	97	176	25	--	85	27	--	--	--	--	--	--
HARDWOODS													
Bur oak	6,634	219	120	476	481	347	352	596	215	607	1,752	981	488
Select white oak	4,875	422	734	1,080	799	365	539	234	141	142	370	49	--
Other white oak	1,787	543	406	303	422	--	50	--	--	--	63	--	--
Select red oak	1,755	104	156	278	353	371	160	--	159	92	56	26	--
Other red oak	2,097	176	446	234	644	135	211	147	--	--	104	--	--
Select hickory	928	231	159	62	--	246	53	--	114	63	--	--	--
Other hickory	934	125	178	184	270	51	--	--	--	--	126	--	--
Pecan	757	94	32	--	55	99	73	195	76	133	--	--	--
Hard maple	125	36	--	--	89	--	--	--	--	--	--	--	--
Soft maple	1,078	--	--	142	208	127	124	83	83	--	216	95	--
Ash	5,446	312	812	848	584	793	855	316	370	46	510	--	--
Cottonwood	4,011	--	178	217	1,140	150	438	116	280	317	184	684	307
Basswood	734	--	--	160	192	64	112	--	82	--	61	63	--
Elm	8,010	1,641	1,788	1,097	821	631	537	318	267	119	586	205	--
Black walnut	5,495	752	603	1,060	1,048	840	497	165	277	180	73	--	--
Willow	821	80	--	167	155	149	59	111	100	--	--	--	--
Boxelder	3,487	307	525	466	256	416	665	672	180	--	--	--	--
Hackberry	9,118	862	1,390	1,029	1,718	1,533	889	499	390	292	354	162	--
Sycamore	250	--	140	--	49	--	61	--	--	--	--	--	--
Other hardwoods	8,677	1,958	2,059	1,092	841	923	525	309	225	324	319	42	60
Total	67,019	7,862	9,726	8,895	10,125	7,240	6,200	3,761	2,959	2,315	4,774	2,307	855
All species	67,429	7,959	9,902	8,920	10,125	7,325	6,227	3,761	2,959	2,315	4,774	2,307	855

Table 68.--Net volume of short-log trees on commercial forest land by species group and diameter class, Kansas, 1981

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS											
Eastern redcedar	779	103	--	173	503	--	--	--	--	--	--
Total	779	103	--	173	503	--	--	--	--	--	--
HARDWOODS											
Bur oak	16,080	--	2,480	1,379	1,419	1,830	589	1,583	4,580	1,657	563
Select white oak	12,269	--	5,010	1,447	3,329	707	396	267	920	193	--
Other white oak	1,994	--	1,715	--	159	--	--	--	120	--	--
Select red oak	4,733	--	1,505	1,462	765	--	392	315	233	61	--
Other red oak	6,328	--	4,089	550	923	556	--	--	210	--	--
Select hickory	1,831	--	--	925	177	--	434	295	--	--	--
Other hickory	1,685	--	885	287	--	--	--	--	513	--	--
Pecan	1,903	--	203	302	243	698	71	386	--	--	--
Hard maple	333	--	333	--	--	--	--	--	--	--	--
Soft maple	2,571	--	667	406	348	38	222	--	721	169	--
Ash	11,798	--	2,013	2,947	2,458	1,573	1,069	129	1,609	--	--
Cottonwood	13,704	--	4,272	600	1,380	421	1,170	1,768	666	2,210	1,217
Basswood	1,571	--	584	185	299	--	340	--	94	69	--
Elm	12,387	--	3,049	2,026	2,041	1,314	804	334	2,008	811	--
Black walnut	13,121	--	4,019	4,847	1,666	542	1,126	635	286	--	--
Willow	2,355	--	472	892	209	430	352	--	--	--	--
Boxelder	7,992	--	888	1,682	2,221	2,386	815	--	--	--	--
Hackberry	21,596	--	8,014	6,146	2,714	1,815	923	690	1,004	290	--
Sycamore	370	--	149	--	221	--	--	--	--	--	--
Other hardwoods	12,504	--	3,296	3,412	2,132	1,249	574	692	1,007	67	75
Total	147,125	--	43,643	29,495	22,704	13,559	9,277	7,094	13,971	5,527	1,855
All species	147,904	103	43,643	29,668	23,207	13,559	9,277	7,094	13,971	5,527	1,855

[1/] International 1/4-inch rule.

Table 69.--Net volume of all live trees on wooded strips by species group and diameter class, Kansas, 1981

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS													
Eastern redcedar	1,186	390	574	222	--	--	--	--	--	--	--	--	--
Total	1,186	390	574	222	--	--	--	--	--	--	--	--	--
HARDWOODS													
Bur oak	11,408	61	--	136	148	141	--	--	--	638	10,284	--	--
Select white oak	382	289	--	93	--	--	--	--	--	--	--	--	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--	--	--
Select red oak	1,915	157	99	567	379	157	--	--	--	--	556	--	--
Other red oak	961	68	49	104	172	481	--	--	87	--	--	--	--
Select hickory	177	177	--	--	--	--	--	--	--	--	--	--	--
Other hickory	815	51	274	268	222	--	--	--	--	--	--	--	--
Pecan	921	--	--	136	135	319	--	331	--	--	--	--	--
Hard maple	34	34	--	--	--	--	--	--	--	--	--	--	--
Soft maple	3,878	364	311	392	98	--	247	316	406	924	775	45	--
Ash	18,985	2,132	2,350	2,300	2,162	1,694	3,103	640	--	4,604	--	--	--
Cottonwood	25,747	159	424	389	905	587	1,320	1,167	1,488	3,205	2,980	13,054	69
Basswood	544	53	45	97	150	199	--	--	--	--	--	--	--
Elm	9,382	2,556	1,392	1,970	919	910	776	814	--	45	--	--	--
Black walnut	4,540	770	894	536	414	957	241	648	--	48	32	--	--
Willow	1,980	146	185	63	624	51	--	96	--	788	27	--	--
Boxelder	6,499	751	1,527	1,041	709	796	786	889	--	--	--	--	--
Hackberry	15,704	2,201	1,670	1,353	1,722	1,400	932	685	1,632	483	3,549	77	--
Sycamore	4,694	--	74	84	--	--	213	--	--	1,072	--	3,251	--
Other hardwoods	11,180	1,181	1,249	1,185	952	1,107	745	951	964	--	1,081	1,765	--
Noncommercial species	5,854	1,338	1,309	1,052	539	152	277	487	--	700	--	--	--
Total	125,600	12,488	11,852	11,766	10,250	8,951	8,640	7,024	4,577	12,507	19,284	18,192	69
All species	126,786	12,878	12,426	11,988	10,250	8,951	8,640	7,024	4,577	12,507	19,284	18,192	69

Table 70.--Net volume of sawtimber on wooded strips by species group and diameter class, Kansas, 1981

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS											
Eastern redcedar	1,220	1,220	--	--	--	--	--	--	--	--	--
Total	1,220	1,220	--	--	--	--	--	--	--	--	--
HARDWOODS											
Bur oak	48,099	--	805	741	--	--	--	2,878	43,675	--	--
Select white oak	--	--	--	--	--	--	--	--	--	--	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	4,633	--	1,651	826	--	--	--	--	2,156	--	--
Other red oak	3,536	--	909	2,627	--	--	--	--	--	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	959	--	959	--	--	--	--	--	--	--	--
Pecan	2,860	--	664	861	--	1,335	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	10,684	--	468	--	1,094	1,589	--	4,321	3,212	--	--
Ash	34,894	--	8,915	5,294	5,293	1,818	--	13,574	--	--	--
Cottonwood	83,646	--	4,365	2,965	6,724	4,939	7,033	13,539	7,665	36,416	--
Basswood	807	--	807	--	--	--	--	--	--	--	--
Elm	9,199	--	477	2,517	2,631	3,574	--	--	--	--	--
Black walnut	8,669	--	1,978	4,448	--	2,243	--	--	--	--	--
Willow	6,433	--	2,234	372	--	373	--	3,454	--	--	--
Boxelder	5,125	--	1,129	570	907	2,519	--	--	--	--	--
Hackberry	41,472	--	7,354	6,112	3,107	3,468	7,899	--	13,158	374	--
Sycamore	14,422	--	--	--	1,082	--	--	4,818	--	8,522	--
Other hardwoods	23,399	--	1,667	3,056	1,252	4,420	4,579	--	--	8,425	--
Total	298,837	--	34,382	30,389	22,090	26,278	19,511	42,584	69,866	53,737	--
All species	300,057	1,220	34,382	30,389	22,090	26,278	19,511	42,584	69,866	53,737	--

[1/] International 1/4-inch rule.

Table 71.--Net volume of short-log trees on wooded strips by species group and diameter class, Kansas, 1981

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
SOFTWOODS											
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--
HARDWOODS											
Bur oak	--	--	--	--	--	--	--	--	--	--	--
Select white oak	--	--	--	--	--	--	--	--	--	--	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	--	--	--	--	--	--	--	--	--	--	--
Other red oak	--	--	--	--	--	--	--	--	--	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Pecan	398	--	--	398	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	--	--	--	--	--	--	--	--	--	--	--
Ash	4,462	--	680	--	2,248	643	--	891	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Basswood	--	--	--	--	--	--	--	--	--	--	--
Elm	1,673	--	343	691	639	--	--	--	--	--	--
Black walnut	991	--	--	313	678	--	--	--	--	--	--
Willow	386	--	386	--	--	--	--	--	--	--	--
Boxelder	3,196	--	1,246	280	757	913	--	--	--	--	--
Hackberry	874	--	325	--	549	--	--	--	--	--	--
Sycamore	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	3,424	--	1,271	421	759	--	--	--	973	--	--
Total	15,404	--	4,251	2,103	5,630	1,556	--	891	973	--	--
All species	15,404	--	4,251	2,103	5,630	1,556	--	891	973	--	--

[1/] International 1/4-inch rule.

Table 72.--Net volume of growing stock on wooded strips by species group and forest type, Kansas, 1981

(In thousand cubic feet)

Species	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
SOFTWOODS											
Eastern redcedar	1,077	1,058	--	--	--	--	--	--	--	--	19
Total	1,077	1,058	--	--	--	--	--	--	--	--	19
HARDWOODS											
Bur oak	11,302	--	231	--	--	10,433	--	--	--	638	--
Select white oak	258	--	258	--	--	--	--	--	--	--	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	1,658	--	305	--	250	887	--	--	--	--	216
Other red oak	874	--	414	--	--	460	--	--	--	--	--
Select hickory	177	--	--	--	--	13	--	--	147	17	--
Other hickory	733	--	384	--	--	285	--	--	64	--	--
Pecan	798	--	--	--	--	798	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	2,953	--	--	--	--	2,905	--	--	--	--	48
Ash	11,081	1,814	--	--	--	6,848	--	--	949	1,434	36
Cottonwood	24,032	14,009	--	--	--	2,279	3,676	997	--	1,583	1,488
Basswood	344	--	--	--	344	--	--	--	--	--	--
Elm	5,154	--	72	--	274	2,266	--	--	583	1,868	91
Black walnut	3,367	--	117	--	85	403	--	--	2,694	--	68
Willow	1,474	--	--	--	43	131	--	168	--	136	996
Boxelder	2,175	--	--	--	--	1,341	--	--	834	--	--
Hackberry	12,709	--	381	--	287	6,461	--	155	4,673	752	--
Sycamore	4,657	--	--	--	--	--	--	--	1,322	3,335	--
Other hardwoods	6,720	--	147	--	545	647	--	16	1,386	3,943	36
Total	90,466	15,823	2,309	--	1,828	36,157	3,676	1,336	12,652	13,706	2,979
All species	91,543	16,881	2,309	--	1,828	36,157	3,676	1,336	12,652	13,706	2,998

Table 73.--Net volume of sawtimber on wooded strips by species group and forest type, Kansas, 1981

(In thousand board feet)[1/]

Species	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
SOFTWOODS											
Eastern redcedar	1,220	1,220	--	--	--	--	--	--	--	--	--
Total	1,220	1,220	--	--	--	--	--	--	--	--	--
HARDWOODS											
Bur oak	48,099	--	741	--	--	44,480	--	--	--	2,878	--
Select white oak	--	--	--	--	--	--	--	--	--	--	--
Other white oak	--	--	--	--	--	--	--	--	--	--	--
Select red oak	4,633	--	--	--	--	3,531	--	--	--	--	1,102
Other red oak	3,536	--	1,329	--	--	2,207	--	--	--	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	959	--	--	--	--	959	--	--	--	--	--
Pecan	2,860	--	--	--	--	2,860	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	10,684	--	--	--	--	10,684	--	--	--	--	--
Ash	34,894	8,180	--	--	--	19,701	--	--	3,413	3,600	--
Cottonwood	83,646	41,355	--	--	--	7,182	16,629	4,187	--	7,260	7,033
Basswood	807	--	--	--	807	--	--	--	--	--	--
Elm	9,199	--	--	--	477	2,631	--	--	1,297	4,794	--
Black walnut	8,669	--	--	--	--	847	--	--	7,367	--	455
Willow	6,433	--	--	--	--	623	--	745	--	484	4,581
Boxelder	5,125	--	--	--	--	2,008	--	--	3,117	--	--
Hackberry	41,472	--	1,037	--	--	24,172	--	374	12,556	3,333	--
Sycamore	14,422	--	--	--	--	--	--	--	5,900	8,522	--
Other hardwoods	23,399	--	413	--	2,093	1,252	--	--	3,991	15,650	--
Total	298,837	49,535	3,520	--	3,377	123,137	16,629	5,306	37,641	46,521	13,171
All species	300,057	50,755	3,520	--	3,377	123,137	16,629	5,306	37,641	46,521	13,171

[1/] International 1/4-inch rule.

Table 74.--Net annual growth of growing stock on commercial forest land by softwoods and hardwoods, Kansas, 1964 and 1980

(In thousand cubic feet)

Species	1964[1/]	1980
Softwoods	--	471
Hardwoods	22,100	22,759
All species	22,100	23,230

[1/] Figures have been adjusted from those published after the 1965 survey to conform to 1980 volumes because of changes in survey definitions and procedures.

Table 75.--Net annual growth of growing stock on commercial forest land by species group and Forest Survey Unit, Kansas, 1980

(In thousand cubic feet)

Species group	All Units	Forest Survey Unit		
		Northeastern Unit	Southeastern Unit	Western Unit
SOFTWOODS				
Eastern redcedar	471	271	197	3
Total	471	271	197	3
HARDWOODS				
Bur oak	1,251	576	433	242
Select white oak	779	485	294	--
Other white oak	594	43	551	--
Select red oak	1,467	674	793	--
Other red oak	611	282	329	--
Select hickory	467	341	126	--
Other hickory	470	341	129	--
Pecan	254	4	247	3
Hard maple	94	58	36	--
Soft maple	941	423	518	--
Ash	1,958	403	892	663
Cottonwood	2,525	1,023	179	1,323
Basswood	199	166	33	--
Elm	678	224	538	-84
Black walnut	2,167	926	1,010	231
Willow	382	138	131	113
Boxelder	762	226	68	468
Hackberry	4,454	1,755	2,184	515
Sycamore	590	268	314	8
Other hardwoods	2,116	1,032	708	376
Total	22,759	9,388	9,513	3,858
All species	23,230	9,659	9,710	3,861

Table 76.--Net annual growth of sawtimber on commercial forest land by species group and Forest Survey Unit, Kansas, 1980

(In thousand board feet)[1/]

Species group	All Units	Forest Survey Unit: Northeastern Unit	Southeastern Unit	Western Unit
SOFTWOODS				
Eastern redcedar	90	95	-5	--
Total	90	95	-5	--
HARDWOODS				
Bur oak	4,255	1,738	1,408	1,109
Select white oak	2,041	1,772	269	--
Other white oak	460	102	358	--
Select red oak	7,275	3,977	3,298	--
Other red oak	1,179	902	277	--
Select hickory	953	796	157	--
Other hickory	1,060	479	581	--
Pecan	1,113	1	1,103	9
Hard maple	607	66	541	--
Soft maple	3,170	1,462	1,708	--
Ash	4,768	870	3,299	599
Cottonwood	8,773	2,432	1,003	5,338
Basswood	360	354	6	--
Elm	-2,234	-2,142	763	-855
Black walnut	5,911	2,892	2,994	25
Willow	2,742	1,860	444	438
Boxelder	1,642	728	476	438
Hackberry	13,246	5,463	6,444	1,339
Sycamore	2,403	892	1,482	29
Other hardwoods	4,223	2,782	984	457
Total	63,947	27,426	27,595	8,926
All species	64,037	27,521	27,590	8,926

[1/] International 1/4-inch rule.

Table 77.--Net annual growth of growing stock on commercial forest land by species group and ownership class, Kansas, 1980

(In thousand cubic feet)

Species group	All classes	Ownership class: National forest	Misc. federal	Indian	State	County and municipal	Farmer	Misc. private
SOFTWOODS								
Eastern redcedar	471	--	2	--	--	--	325	144
Total	471	--	2	--	--	--	325	144
HARDWOODS								
Bur oak	1,251	--	164	--	4	--	715	368
Select white oak	779	--	15	--	--	7	314	443
Other white oak	594	--	18	--	--	--	432	144
Select red oak	1,467	--	27	--	--	--	891	549
Other red oak	611	--	6	--	22	--	270	313
Select hickory	467	--	13	--	4	--	252	198
Other hickory	470	--	8	--	--	--	309	153
Pecan	254	--	--	--	2	--	113	139
Hard maple	94	--	--	--	--	--	29	65
Soft maple	941	--	22	--	75	42	567	235
Ash	1,958	--	40	--	25	--	1,347	546
Cottonwood	2,525	--	276	2	159	--	1,656	432
Basswood	199	--	2	--	--	--	125	72
Elm	678	--	52	3	5	2	519	97
Black walnut	2,167	--	50	--	2	--	1,162	953
Willow	382	--	2	--	4	23	248	105
Boxelder	762	--	--	--	--	10	475	277
Hackberry	4,454	--	203	7	2	54	2,828	1,360
Sycamore	590	--	42	--	--	--	447	101
Other hardwoods	2,116	--	78	13	12	14	1,336	663
Total	22,759	--	1,018	25	316	152	14,035	7,213
All species	23,230	--	1,020	25	316	152	14,360	7,357

Table 78.--Net annual growth of sawtimber on commercial forest land by species group and ownership class, Kansas, 1980

(In thousand board feet)[1/]

Species group	All classes	Ownership class						
		National forest	Misc. federal	Indian	State	County and municipal	Farmer	Misc. private
SOFTWOODS								
Eastern redcedar	90	--	--	--	--	--	70	20
Total	90	--	--	--	--	--	70	20
HARDWOODS								
Bur oak	4,255	--	104	--	11	--	2,954	1,186
Select white oak	2,041	--	30	--	--	--	1,395	616
Other white oak	460	--	39	--	--	--	355	66
Select red oak	7,275	--	627	--	--	--	2,689	3,959
Other red oak	1,179	--	--	--	116	--	158	905
Select hickory	953	--	3	--	8	--	305	637
Other hickory	1,060	--	--	--	--	--	93	967
Pecan	1,113	--	--	--	6	--	807	300
Hard maple	607	--	--	--	--	--	308	299
Soft maple	3,170	--	95	--	250	237	1,177	1,411
Ash	4,768	--	112	--	420	--	3,323	913
Cottonwood	8,773	--	843	2	--	--	6,435	1,493
Basswood	360	--	9	--	--	--	240	111
Elm	-2,234	--	-14	--	--	7	-1,392	-835
Black walnut	5,911	--	211	--	13	--	3,560	2,127
Willow	2,742	--	--	--	--	187	2,155	400
Boxelder	1,642	--	--	--	--	367	685	590
Hackberry	13,246	--	340	13	9	120	8,437	4,327
Sycamore	2,403	--	148	--	--	--	1,938	317
Other hardwoods	4,223	--	111	44	33	70	2,131	1,834
Total	63,947	--	2,658	59	866	988	37,753	21,623
All species	64,037	--	2,658	59	866	988	37,823	21,643

[1/] International 1/4-inch rule.

Table 79.--Net annual growth of growing stock on commercial forest land by species group and forest type, Kansas, 1980

(In thousand cubic feet)

Species	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
SOFTWOODS											
Eastern redcedar	471	170	22	--	23	2	--	--	102	146	6
Total	471	170	22	--	23	2	--	--	102	146	6
HARDWOODS											
Bur oak	1,251	2	430	8	163	65	--	--	574	8	1
Select white oak	779	-23	632	1	17	122	--	--	21	9	--
Other white oak	594	3	111	470	9	--	--	--	--	1	--
Select red oak	1,467	2	1,205	24	68	43	--	--	89	36	--
Other red oak	611	--	457	83	6	-24	63	--	13	13	--
Select hickory	467	2	389	-15	7	36	--	--	32	16	--
Other hickory	470	--	329	7	27	25	--	--	78	4	--
Pecan	254	--	183	--	15	42	--	--	3	11	--
Hard maple	94	--	37	--	--	31	--	--	11	15	--
Soft maple	941	--	11	--	--	754	2	--	167	7	--
Ash	1,958	--	152	--	18	1,260	105	9	268	142	4
Cottonwood	2,525	--	39	--	7	261	2,054	12	100	16	36
Basswood	199	--	55	--	55	6	4	--	65	14	--
Elm	678	2	205	--	160	467	46	--	-369	160	7
Black walnut	2,167	21	369	3	293	272	24	--	1,117	65	3
Willow	382	--	5	--	3	334	-3	24	9	5	5
Boxelder	762	--	7	--	10	594	23	--	122	4	2
Hackberry	4,454	2	312	1	355	763	13	--	2,939	46	23
Sycamore	590	--	60	-8	10	223	10	--	277	16	2
Other hardwoods	2,116	2	201	3	71	834	18	--	660	304	23
Total	22,759	13	5,189	577	1,294	6,108	2,359	45	6,176	892	106
All species	23,230	183	5,211	577	1,317	6,110	2,359	45	6,278	1,038	112

Table 80.--Net annual growth of sawtimber on commercial forest land by species group and forest type, Kansas, 1980

(In thousand board feet)[1/]

Species	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
SOFTWOODS											
Eastern redcedar	90	5	33	--	--	--	--	--	--	46	6
Total	90	5	33	--	--	--	--	--	--	46	6
HARDWOODS											
Bur oak	4,255	6	1,675	--	179	312	--	--	2,055	28	--
Select white oak	2,041	53	1,797	6	25	50	--	--	81	29	--
Other white oak	460	3	232	186	36	--	--	--	--	3	--
Select red oak	7,275	--	5,431	40	71	207	--	--	1,440	86	--
Other red oak	1,179	--	1,193	83	15	-200	--	--	46	42	--
Select hickory	953	--	412	2	23	106	--	--	392	18	--
Other hickory	1,060	--	568	--	--	40	--	--	449	3	--
Pecan	1,113	--	887	--	--	187	--	--	9	30	--
Hard maple	607	--	538	--	--	47	--	--	--	22	--
Soft maple	3,170	--	219	--	--	1,945	13	--	982	11	--
Ash	4,768	--	296	--	29	3,035	47	14	1,309	27	11
Cottonwood	8,773	--	125	--	24	456	7,600	60	350	51	107
Basswood	360	--	170	--	86	32	--	--	14	58	--
Elm	-2,234	1	-126	--	81	-419	18	--	-1,964	160	15
Black walnut	5,911	31	679	--	391	1,040	396	--	3,226	148	--
Willow	2,742	--	-1	--	--	2,493	106	80	23	13	28
Boxelder	1,642	--	9	--	367	921	38	--	307	--	--
Hackberry	13,246	--	620	6	1,336	2,295	92	--	8,774	59	64
Sycamore	2,403	--	489	--	36	558	27	--	1,219	66	8
Other hardwoods	4,223	--	421	5	107	1,660	12	--	1,087	914	17
Total	63,947	94	15,634	328	2,806	14,765	8,349	154	19,799	1,768	250
All species	64,037	99	15,667	328	2,806	14,765	8,349	154	19,799	1,814	256

[1/] International 1/4-inch rule.

Table 81.--Net annual growth of growing stock on commercial forest land by forest type and stand-age class, Kansas, 1980

(In thousand cubic feet)

Forest type	All classes	Stand-age class (years)												
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Eastern redcedar-hardwood	183	38	70	--	-25	--	64	--	--	--	--	--	36	--
Oak-hickory	5,211	54	140	406	576	621	711	815	789	300	439	236	109	15
Post-blackjack oak	577	3	2	-1	101	362	10	6	7	48	--	39	--	--
Upland plains hardwoods	1,317	33	178	266	220	144	222	164	23	26	--	7	34	--
Elm-ash-cottonwood	6,110	121	594	215	672	291	1,466	1,109	952	183	191	316	--	--
Cottonwood	2,359	6	2	119	176	191	305	714	241	129	315	161	--	--
Willow	45	2	29	10	--	--	4	--	--	--	--	--	--	--
Lowland plains hardwoods	6,278	91	384	181	555	227	1,142	1,555	1,180	469	319	119	10	46
Upland elm-ash-locust	1,038	165	193	139	215	16	42	42	123	40	38	--	25	--
Nonstocked	112	15	7	25	13	--	40	5	6	1	--	--	--	--
All types	23,230	528	1,599	1,360	2,503	1,852	4,006	4,410	3,321	1,196	1,302	878	214	61

Table 82.--Net annual growth of sawtimber on commercial forest land by forest type and stand-age class, Kansas, 1980

(In thousand board feet)[1/]

Forest type	All classes	Stand-age class (years)												
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Eastern redcedar-hardwood	99	48	16	--	16	--	-57	--	--	--	--	--	76	--
Oak-hickory	15,667	521	8	946	1,855	1,237	1,988	2,049	2,556	1,236	2,194	743	288	46
Post-blackjack oak	328	7	--	--	11	113	14	9	-19	112	--	81	--	--
Upland plains hardwoods	2,806	23	165	124	929	87	390	868	73	64	--	20	63	--
Elm-ash-cottonwood	14,765	209	502	709	460	1,558	4,620	3,588	1,698	126	927	368	--	--
Cottonwood	8,349	--	8	320	-16	440	1,675	2,911	1,204	371	954	482	--	--
Willow	154	8	113	11	--	--	22	--	--	--	--	--	--	--
Lowland plains hardwoods	19,799	273	357	569	1,912	1,095	3,821	5,380	3,377	1,552	853	493	30	87
Upland elm-ash-locust	1,814	202	216	274	180	26	481	97	70	110	99	--	59	--
Nonstocked	256	76	13	--	17	--	105	28	14	3	--	--	--	--
All types	64,037	1,367	1,398	2,953	5,364	4,556	13,059	14,930	8,973	3,574	5,027	2,187	516	133

[1/] International 1/4-inch rule.

Table 83.--Net annual growth of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Kansas, 1980

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Eastern redcedar-hardwood															
Sawtimber	82	--	--	--	--	--	--	--	--	--	--	82	--	--	--
Poletimber	-7	--	--	--	--	--	--	-25	18	--	--	--	--	--	--
Sapling & seedling	108	--	7	9	6	20	66	--	--	--	--	--	--	--	--
All stands	183	--	7	9	6	20	66	-25	18	--	--	82	--	--	--
Oak-hickory															
Sawtimber	2,831	--	--	36	16	188	223	284	265	810	230	640	139	--	--
Poletimber	2,005	--	--	--	-1	36	176	271	414	257	84	627	141	--	--
Sapling & seedling	375	-37	-1	101	8	214	39	22	1	25	3	--	--	--	--
All stands	5,211	-37	-1	137	23	438	438	577	680	1,092	317	1,267	280	--	--
Post-blackjack oak															
Sawtimber	79	--	--	-20	--	--	15	6	47	31	--	--	--	--	--
Poletimber	438	--	--	--	--	--	--	--	35	83	91	210	19	--	--
Sapling & seedling	60	--	--	2	--	--	3	3	--	--	52	--	--	--	--
All stands	577	--	--	-18	--	--	18	9	82	114	143	210	19	--	--
Upland plains hardwoods															
Sawtimber	466	--	--	--	16	30	27	31	144	131	--	--	87	--	--
Poletimber	721	--	--	5	--	18	143	109	9	119	154	164	--	--	--
Sapling & seedling	130	--	--	12	9	25	--	63	6	15	--	--	--	--	--
All stands	1,317	--	--	17	25	73	170	203	159	265	154	164	87	--	--
Elm-ash-cottonwood															
Sawtimber	4,270	--	--	50	71	251	184	330	696	245	479	490	924	550	--
Poletimber	1,072	--	--	-4	--	42	147	112	61	114	13	587	--	--	--
Sapling & seedling	768	-24	7	93	145	401	97	-71	85	7	28	--	--	--	--
All stands	6,110	-24	7	139	216	694	428	371	842	366	520	1,077	924	550	--
Cottonwood															
Sawtimber	2,060	--	4	13	--	61	104	--	305	163	161	483	289	269	208
Poletimber	261	--	--	--	--	--	89	--	9	--	163	--	--	--	--
Sapling & seedling	38	--	2	--	6	--	--	--	--	30	--	--	--	--	--
All stands	2,359	--	6	13	6	61	193	--	314	193	324	483	289	269	208

(Table 83 continued on next page)

(Table 83 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Willow															
Sawtimber	4	--	--	--	--	--	--	--	--	--	--	4	--	--	--
Poletimber	10	--	--	10	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	31	2	--	--	--	--	29	--	--	--	--	--	--	--	--
All stands	45	2	--	10	--	--	29	--	--	--	--	4	--	--	--
Lowland plains hardwoods															
Sawtimber	4,759	--	--	12	62	208	632	364	658	825	492	1,221	285	--	--
Poletimber	1,138	--	18	24	--	--	111	80	181	115	87	522	--	--	--
Sapling & seedling	381	--	10	8	61	196	49	19	38	--	--	--	--	--	--
All stands	6,278	--	28	44	123	404	792	463	877	940	579	1,743	285	--	--
Upland elm-ash-locust															
Sawtimber	272	--	--	3	4	7	64	47	50	70	27	--	--	--	--
Poletimber	388	--	--	--	9	--	27	135	21	41	26	129	--	--	--
Sapling & seedling	378	-2	95	36	17	94	48	23	46	16	5	--	--	--	--
All stands	1,038	-2	95	39	30	101	139	205	117	127	58	129	--	--	--
Nonstocked	112	2	44	4	15	32	15	--	--	--	--	--	--	--	--
All types															
Sawtimber	14,823	--	4	94	169	745	1,249	1,062	2,165	2,275	1,389	2,920	1,724	819	208
Poletimber	6,026	--	18	35	8	96	693	682	748	729	618	2,239	160	--	--
Sapling & seedling	2,269	-61	120	261	252	950	331	59	176	93	88	--	--	--	--
Nonstocked	112	2	44	4	15	32	15	--	--	--	--	--	--	--	--
All stands	23,230	-59	186	394	444	1,823	2,288	1,803	3,089	3,097	2,095	5,159	1,884	819	208

Table 84.--Net annual growth of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Kansas, 1980

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Eastern redcedar-hardwood															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	35	--	--	--	--	--	--	16	19	--	--	--	--	--	--
Sapling & seedling	64	--	--	17	10	30	7	--	--	--	--	--	--	--	--
All stands	99	--	--	17	10	30	7	16	19	--	--	--	--	--	--
Oak-hickory															
Sawtimber	11,265	--	--	--	66	1,329	1,180	1,191	1,273	2,974	664	2,162	426	--	--
Poletimber	3,840	--	--	--	--	29	253	253	515	857	159	1,643	131	--	--
Sapling & seedling	562	-204	-3	74	-165	765	85	50	-75	27	8	--	--	--	--
All stands	15,667	-204	-3	74	-99	2,123	1,518	1,494	1,713	3,858	831	3,805	557	--	--
Post-blackjack oak															
Sawtimber	153	--	--	-60	--	--	26	11	97	79	--	--	--	--	--
Poletimber	164	--	--	--	--	--	--	--	31	41	78	14	--	--	--
Sapling & seedling	11	--	--	--	--	--	4	7	--	--	--	--	--	--	--
All stands	328	--	--	-60	--	--	30	18	128	120	78	14	--	--	--
Upland plains hardwoods															
Sawtimber	1,439	--	--	--	102	95	52	81	201	344	--	--	564	--	--
Poletimber	1,274	--	--	--	--	47	60	56	--	436	106	569	--	--	--
Sapling & seedling	93	--	--	--	42	19	--	--	4	28	--	--	--	--	--
All stands	2,806	--	--	--	144	161	112	137	205	808	106	569	564	--	--
Elm-ash-cottonwood															
Sawtimber	12,797	--	--	219	334	1,398	509	1,070	1,908	1,011	728	1,576	2,419	1,625	--
Poletimber	1,023	--	--	-4	--	42	198	134	97	144	15	397	--	--	--
Sapling & seedling	945	-121	10	246	147	830	197	-536	13	30	129	--	--	--	--
All stands	14,765	-121	10	461	481	2,270	904	668	2,018	1,185	872	1,973	2,419	1,625	--
Cottonwood															
Sawtimber	8,059	--	22	36	--	170	352	--	1,704	469	373	1,654	1,295	1,191	793
Poletimber	273	--	--	--	--	--	311	--	-38	--	--	--	--	--	--
Sapling & seedling	17	--	8	--	--	--	--	--	--	9	--	--	--	--	--
All stands	8,349	--	30	36	--	170	663	--	1,666	478	373	1,654	1,295	1,191	793

(Table 84 continued on next page)

[1/] International 1/4-inch rule.

(Table 84 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Willow															
Sawtimber	22	--	--	--	--	--	--	--	--	--	--	22	--	--	--
Poletimber	11	--	--	11	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	121	8	--	--	--	--	113	--	--	--	--	--	--	--	--
All stands	154	8	--	11	--	--	113	--	--	--	--	22	--	--	--
Lowland plains hardwood															
Sawtimber	15,423	--	--	48	300	693	1,596	1,236	1,600	2,178	2,072	4,594	1,106	--	--
Poletimber	3,353	--	--	19	--	--	1,123	412	799	444	20	536	--	--	--
Sapling & seedling	1,023	--	45	-6	159	470	149	159	47	--	--	--	--	--	--
All stands	19,799	--	45	61	459	1,163	2,868	1,807	2,446	2,622	2,092	5,130	1,106	--	--
Upland elm-ash-locust															
Sawtimber	921	--	--	8	10	12	30	116	141	537	67	--	--	--	--
Poletimber	417	--	--	--	195	--	53	83	9	3	61	13	--	--	--
Sapling & seedling	476	--	65	59	75	135	87	--	31	11	13	--	--	--	--
All stands	1,814	--	65	67	280	147	170	199	181	551	141	13	--	--	--
Nonstocked	256	--	159	8	34	50	5	--	--	--	--	--	--	--	--
All types															
Sawtimber	50,079	--	22	251	812	3,697	3,745	3,705	6,924	7,592	3,904	10,008	5,810	2,816	793
Poletimber	10,390	--	--	26	195	118	1,998	954	1,432	1,925	439	3,172	131	--	--
Sapling & seedling	3,312	-317	125	390	268	2,249	642	-320	20	105	150	--	--	--	--
Nonstocked	256	--	159	8	34	50	5	--	--	--	--	--	--	--	--
All stands	64,037	-317	306	675	1,309	6,114	6,390	4,339	8,376	9,622	4,493	13,180	5,941	2,816	793

Table 85.--Net annual growth of growing stock on wooded strips by species group and Forest Survey Unit, Kansas, 1980

(In thousand cubic feet)

Species group	All Units	Forest Survey Unit: North-eastern Unit	South-eastern Unit	Western Unit
SOFTWOODS				
Eastern redcedar	107	11	--	96
Total	107	11	--	96
HARDWOODS				
Bur oak	157	11	21	125
Select white oak	41	--	41	--
Other white oak	--	--	--	--
Select red oak	45	8	37	--
Other red oak	24	9	15	--
Select hickory	9	8	1	--
Other hickory	22	7	15	--
Pecan	10	--	10	--
Hard maple	--	--	--	--
Soft maple	120	95	25	--
Ash	360	96	70	194
Cottonwood	-32	92	-316	192
Basswood	26	26	--	--
Elm	199	128	66	5
Black walnut	107	75	32	--
Willow	34	20	6	8
Boxelder	99	71	28	--
Hackberry	840	201	411	228
Sycamore	88	53	35	--
Other hardwoods	196	153	43	--
Total	2,345	1,053	540	752
All species	2,452	1,064	540	848

Table 86.--Net annual growth of sawtimber on wooded strips by species group and Forest Survey Unit, Kansas, 1980

(In thousand board feet)[1/]

Species group	All Units	Forest Survey Unit: North-eastern Unit	South-eastern Unit	Western Unit
SOFTWOODS				
Eastern redcedar	53	--	--	53
Total	53	--	--	53
HARDWOODS				
Bur oak	581	36	81	464
Select white oak	--	--	--	--
Other white oak	--	--	--	--
Select red oak	99	--	99	--
Other red oak	78	52	26	--
Select hickory	--	--	--	--
Other hickory	20	--	20	--
Pecan	28	--	28	--
Hard maple	--	--	--	--
Soft maple	221	174	47	--
Ash	1,272	865	90	317
Cottonwood	1,806	802	-624	1,628
Basswood	12	12	--	--
Elm	154	72	82	--
Black walnut	180	137	43	--
Willow	1,690	531	27	1,132
Boxelder	159	44	115	--
Hackberry	2,178	730	1,173	275
Sycamore	186	60	126	--
Other hardwoods	488	356	132	--
Total	9,152	3,871	1,465	3,816
All species	9,205	3,871	1,465	3,869

[1/] International 1/4-inch rule.

Table 87.--Timber removals from growing stock on commercial forest land, by species group and Forest Survey Unit, Kansas, 1980

(In thousand cubic feet)

Species group	All Units	Forest Survey Unit: North-eastern Unit	South-eastern Unit	Western Unit
SOFTWOODS				
Eastern redcedar	89	40	14	35
Total	89	40	14	35
HARDWOODS				
Bur oak	1,303	604	360	339
Select white oak	700	434	266	--
Other white oak	480	41	439	--
Select red oak	1,195	573	604	18
Other red oak	703	341	362	--
Select hickory	168	115	53	--
Other hickory	106	58	48	--
Pecan	85	--	85	--
Hard maple	15	3	12	--
Soft maple	500	201	297	2
Ash	1,629	451	888	290
Cottonwood	1,935	893	559	483
Basswood	17	17	--	--
Elm	685	280	337	68
Black walnut	1,307	787	508	12
Hackberry	1,220	437	672	111
Sycamore	320	70	237	13
Other hardwoods[1/]	1,526	694	530	302
Total	13,894	5,999	6,257	1,638
All species	13,983	6,039	6,271	1,673

[1/] Includes willow and boxelder species groups.

Table 88.--Timber removals from sawtimber on commercial forest land, by species group and Forest Survey Unit, Kansas, 1980

(In thousand board feet)[1/]

Species group	All Units	Forest Survey Unit: North-eastern Unit	South-eastern Unit	Western Unit
SOFTWOODS				
Eastern redcedar	324	132	30	162
Total	324	132	30	162
HARDWOODS				
Bur oak	4,771	2,002	1,721	1,048
Select white oak	1,881	1,203	678	--
Other white oak	830	94	736	--
Select red oak	3,529	1,620	1,832	77
Other red oak	2,199	1,082	1,117	--
Select hickory	527	344	183	--
Other hickory	257	157	100	--
Pecan	394	4	389	1
Hard maple	41	8	33	--
Soft maple	2,126	699	1,422	5
Ash	5,484	1,538	3,058	888
Cottonwood	9,154	4,334	3,146	1,674
Basswood	66	65	1	--
Elm	2,538	936	1,362	240
Black walnut	8,281	4,977	3,204	100
Hackberry	4,890	1,585	2,879	426
Sycamore	1,611	321	1,220	70
Other hardwoods[2/]	4,350	1,951	1,504	895
Total	52,929	22,920	24,585	5,424
All species	53,253	23,052	24,615	5,586

[1/] International 1/4-inch rule.

[2/] Includes willow and boxelder species groups.

Table 89.--Timber removals[1] from growing stock and sawtimber on commercial forest land by species group, Kansas, 1964 and 1980

Species group	Growing stock		Sawtimber	
	1964[2]	1980	1964[2]	1980
	Thousand cubic feet		Thousand board feet[3]	
SOFTWOODS				
Eastern redcedar	21	89	--	324
Total	21	89	--	324
HARDWOODS				
Bur oak	953	1,303	3,604	4,771
Select white oak	120	700	502	1,881
Other white oak	295	480	493	830
Select red oak	156	1,195	169	3,529
Other red oak	492	703	1,455	2,199
Select hickory	330	168	981	527
Other hickory	209	106	479	257
Pecan	72	85	257	394
Hard maple	12	15	4	41
Soft maple	667	500	2,732	2,126
Ash	607	1,629	1,550	5,484
Cottonwood	1,120	1,935	4,183	9,154
Basswood	19	17	11	66
Elm	848	685	2,539	2,538
Black walnut	1,180	1,307	7,240	8,281
Hackberry	626	1,220	2,351	4,890
Sycamore	259	320	903	1,611
Other hardwoods[4]	314	1,526	547	4,350
Total	8,279	13,894	30,000	52,929
All species	8,300	13,983	30,000	53,253

[1] Removals in 1980 are trend-level removals.

[2] Figures have been adjusted from those published after the 1966 survey to conform to 1980 volumes because of changes in survey definitions and procedures.

[3] International 1/4-inch rule.

[4] Includes willow and boxelder species groups.

Table 90.--Timber removals from growing stock and sawtimber on commercial forest land by item and species category, Kansas, 1980

Item	All species	Softwoods	Oak	Elm-hackberry	Ash	Cottonwood	Walnut	Other hardwoods
				Species category				
GROWING STOCK								
				-Thousand cubic feet-				
ROUNDWOOD PRODUCTS								
Saw logs	4,340	66	730	638	336	940	1,138	492
Veneer logs	72	--	12	--	--	--	60	--
Cooperage logs	40	--	40	--	--	--	--	--
Fuelwood	7,577	--	3,184	1,033	1,034	398	--	1,928
Posts	52	18	19	--	--	--	--	15
Total	12,081	84	3,985	1,671	1,370	1,338	1,198	2,435
LOGGING RESIDUE	755	--	231	69	137	140	109	69
OTHER REMOVALS	1,147	5	165	165	122	457	--	233
ALL TIMBER REMOVALS	13,983	89	4,381	1,905	1,629	1,935	1,307	2,737
SAWTIMBER								
				-Thousand board feet[1]-				
ROUNDWOOD PRODUCTS								
Saw logs	26,269	312	3,358	4,017	1,991	6,107	7,431	3,053
Veneer logs	475	--	59	--	--	--	416	--
Cooperage logs	237	--	237	--	--	--	--	--
Fuelwood	20,895	--	8,773	2,850	2,851	1,097	--	5,324
Posts	114	11	62	--	--	--	--	41
Total	47,990	323	12,489	6,867	4,842	7,204	7,847	8,418
LOGGING RESIDUE	1,637	--	327	125	315	293	434	143
OTHER REMOVALS	3,626	1	394	436	327	1,657	--	811
ALL TIMBER REMOVALS	53,253	324	13,210	7,428	5,484	9,154	8,281	9,372

[1] International 1/4-inch rule.

Table 91.--Net annual growth and removals of growing stock on commercial forest land by species group, Kansas, 1980

(In thousand cubic feet)

Species group	Net annual growth	Annual timber removals
SOFTWOODS		
Eastern redcedar	471	89
Total	471	89
HARDWOODS		
Bur oak	1,251	1,303
Select white oak	779	700
Other white oak	594	480
Select red oak	1,467	1,195
Other red oak	611	703
Select hickory	467	168
Other hickory	470	106
Pecan	254	85
Hard maple	94	15
Soft maple	941	500
Ash	1,958	1,629
Cottonwood	2,525	1,935
Basswood	199	17
Elm	678	685
Black walnut	2,167	1,307
Hackberry	4,454	1,220
Sycamore	590	320
Other hardwoods[1]	3,260	1,526
Total	22,759	13,894
All species	23,230	13,983

[1] Includes willow and boxelder species groups.

Table 92.--Net annual growth and removals of sawtimber on commercial forest land by species group, Kansas, 1980

(In thousand board feet)[1/]

Species group	Net annual growth	Annual timber removals
SOFTWOODS		
Eastern redcedar	90	324
Total	90	324
HARDWOODS		
Bur oak	4,255	4,771
Select white oak	2,041	1,881
Other white oak	460	830
Select red oak	7,275	3,529
Other red oak	1,179	2,199
Select hickory	953	527
Other hickory	1,060	257
Pecan	1,113	394
Hard maple	607	41
Soft maple	3,170	2,126
Ash	4,768	5,484
Cottonwood	8,773	9,154
Basswood	360	66
Elm	-2,234	2,538
Black walnut	5,911	8,281
Hackberry	13,246	4,890
Sycamore	2,403	1,611
Other hardwoods[2/]	8,607	4,350
Total	63,947	52,929
All species	64,037	53,253

[1/] International 1/4-inch rule.

[2/] Includes willow and boxelder species groups.

Table 93.--Net annual growth and removals of growing stock on commercial forest land by ownership class and softwoods and hardwoods, Kansas, 1980

(In thousand cubic feet)

Ownership class	Net annual growth			Annual timber removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
PUBLIC						
National Forest	--	--	--	--	--	--
Misc. federal	1,020	2	1,018	13	--	13
Indian	25	--	25	6	--	6
State	316	--	316	--	--	--
County & municipal	152	--	152	--	--	--
Total	1,513	2	1,511	19	--	19
PRIVATE						
Farmer and Misc. private	21,717	469	21,248	13,964	89	13,875
All owners	23,230	471	22,759	13,983	89	13,894

Table 94.--Net annual growth and removals of sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Kansas, 1980

(In thousand board feet)[1/]

Ownership class	Net annual growth			Annual timber removals		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
PUBLIC						
National Forest	--	--	--	--	--	--
Misc. federal	2,658	--	2,658	33	--	33
Indian	59	--	59	17	--	17
State	866	--	866	--	--	--
County & municipal	988	--	988	--	--	--
Total	4,571	--	4,571	50	--	50
PRIVATE						
Farmer and Misc. private	59,466	90	59,376	53,203	324	52,879
All owners	64,037	90	63,947	53,253	324	52,929

[1/]International 1/4-inch rule.

Table 95.--Annual mortality of growing stock on commercial forest land by softwoods and hardwoods, Kansas, 1964 and 1980

(In thousand cubic feet)

Species	1964[1/]	1980
Softwoods	--	28
Hardwoods	3,280	3,739
All species	3,280	3,767

[1/]Figures have been adjusted from those published after the 1965 survey to conform to 1980 volumes because of changes in survey definitions and procedures.

Table 96.--Annual mortality of growing stock on commercial forest land by species group and cause, Kansas, 1980

(In thousand cubic feet)

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
SOFTWOODS								
Eastern redcedar	28	--	--	--	--	--	28	--
Total	28	--	--	--	--	--	28	--
HARDWOODS								
Bur oak	220	--	117	4	--	6	--	93
Select white oak	94	--	22	--	28	--	--	44
Other white oak	46	--	--	12	--	--	--	34
Select red oak	210	--	77	--	--	42	--	91
Other red oak	216	--	115	--	--	52	--	49
Select hickory	39	--	29	--	--	--	--	10
Other hickory	10	--	7	--	--	--	--	3
Pecan	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--
Soft maple	12	--	--	--	--	--	--	12
Ash	177	--	20	--	--	10	3	144
Cottonwood	853	122	91	--	66	153	--	421
Basswood	6	--	6	--	--	--	--	--
Elm	1,283	7	865	8	--	27	--	376
Black walnut	223	--	55	5	--	--	--	163
Willow	57	--	17	--	--	--	--	40
Boxelder	40	--	--	--	--	35	5	--
Hackberry	158	--	93	6	--	--	--	59
Sycamore	69	--	--	--	--	--	--	69
Other hardwoods	26	--	--	--	--	--	--	26
Total	3,739	129	1,514	35	94	325	8	1,634
All species	3,767	129	1,514	35	94	325	36	1,634

Table 97.--Annual mortality of sawtimber on commercial forest land by species group and cause, Kansas, 1980

(In thousand board feet)[1/]

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
SOFTWOODS								
Eastern redcedar	157	--	--	--	--	--	157	--
Total	157	--	--	--	--	--	157	--
HARDWOODS								
Bur oak	484	--	119	21	--	28	--	316
Select white oak	247	--	93	--	133	--	--	21
Other white oak	91	--	--	23	--	--	--	68
Select red oak	660	--	356	--	--	174	--	130
Other red oak	1,145	--	624	--	--	292	--	229
Select hickory	71	--	26	--	--	--	--	45
Other hickory	34	--	34	--	--	--	--	--
Pecan	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--
Soft maple	56	--	--	--	--	--	--	56
Ash	716	--	89	--	--	48	--	579
Cottonwood	2,651	614	371	--	332	459	--	875
Basswood	--	--	--	--	--	--	--	--
Elm	4,295	30	2,944	--	--	126	--	1,195
Black walnut	773	--	135	26	--	--	--	612
Willow	85	--	85	--	--	--	--	--
Boxelder	--	--	--	--	--	--	--	--
Hackberry	599	--	397	30	--	--	--	172
Sycamore	195	--	--	--	--	--	--	195
Other hardwoods	60	--	--	--	--	--	--	60
Total	12,162	644	5,273	100	465	1,127	--	4,553
All species	12,319	644	5,273	100	465	1,127	157	4,553

[1/] International 1/4-inch rule.

Table 98.--Annual mortality of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Kansas, 1980

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			Thousand board feet[1/]		
National Forest	--	--	--	--	--	--
Miscellaneous federal	36	--	36	127	--	127
Indian	--	--	--	--	--	--
State	--	--	--	--	--	--
County and municipal	--	--	--	--	--	--
Farmer	2,027	28	1,999	7,104	157	6,947
Misc. private	1,704	--	1,704	5,088	--	5,088
All owners	3,767	28	3,739	12,319	157	12,162

[1/] International 1/4-inch rule.

Table 99.--Output of timber products by product, softwoods and hardwoods, and source of material, Kansas, 1980

Product and softwoods and hardwoods	Standard units	Total		Roundwood products				Plant byproducts	
				Growing stock		Nongrowing stock			
		No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet
SAW LOGS									
Softwood	Thousand board feet[1/]	321	66	321	66	--	--	--	--
Hardwood		31,565	5,036	26,789	4,274	4,776	762	--	--
Total		31,886	5,102	27,110	4,340	4,776	762	--	--
VENEER LOGS									
Softwood	Thousand board feet[1/]	--	--	--	--	--	--	--	--
Hardwood		537	81	473	72	64	9	--	--
Total		537	81	473	72	64	9	--	--
COOPERAGE									
Softwood	Thousand board feet[1/]	--	--	--	--	--	--	--	--
Hardwood		264	44	240	40	24	4	--	--
Total		264	44	240	40	24	4	--	--
FUELWOOD									
Softwood	Standard cords[2/]	160	11	--	--	--	--	160	11
Hardwood		272,926	19,098	108,285	7,577	146,715	10,266	17,926	1,255
Total		273,086	19,109	108,285	7,577	146,715	10,266	18,086	1,266
POSTS									
Softwood	Thousand pieces	35	26	24	18	11	8	--	--
Hardwood		315	177	61	34	254	143	--	--
Total		350	203	85	52	265	151	--	--
OTHER[3/]									
Softwood	Thousand cubic feet	6	6	--	--	--	--	6	6
Hardwood		470	470	--	--	--	--	470	470
Total		476	476	--	--	--	--	476	476
ALL PRODUCTS									
Softwood	Thousand cubic feet	--	109	--	84	--	8	--	17
Hardwood		--	24,906	--	11,997	--	11,184	--	1,725
Total		--	25,015	--	12,081	--	11,192	--	1,742

[1/] International 1/4-inch rule.

[2/] Unpeeled, 128 cubic-foot basis.

[3/] Includes charcoal wood, livestock bedding, mulch, and specialty items.

Table 100.--Output of roundwood products by product, softwoods and hardwoods, and source of material, Kansas, 1980

(In thousand cubic feet)

Product and softwoods and hardwoods	All sources	Growing-stock trees			Rough and rotten trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
INDUSTRIAL PRODUCTS							
Saw logs							
Softwood	66	66	66	--	--	--	--
Hardwood	5,036	4,274	4,243	31	547	20	195
Subtotal	5,102	4,340	4,309	31	547	20	195
Veneer logs							
Softwood	--	--	--	--	--	--	--
Hardwood	81	72	72	--	--	--	9
Subtotal	81	72	72	--	--	--	9
Cooperage							
Softwood	--	--	--	--	--	--	--
Hardwood	44	40	40	--	4	--	--
Subtotal	44	40	40	--	4	--	--
Posts (Round and split)							
Softwood	26	18	6	12	--	1	7
Hardwood	177	34	24	10	6	--	137
Subtotal	203	52	30	22	6	1	144
All industrial products							
Softwood	92	84	72	12	--	1	7
Hardwood	5,338	4,420	4,379	41	557	20	341
Total	5,430	4,504	4,451	53	557	21	348
FUELWOOD							
Softwood	--	--	--	--	--	--	--
Hardwood	17,843	7,577	4,177	3,400	3,734	266	6,266
Total	17,843	7,577	4,177	3,400	3,734	266	6,266
ALL PRODUCTS							
Softwood	92	84	72	12	--	1	7
Hardwood	23,181	11,997	8,556	3,441	4,291	286	6,607
Total	23,273	12,081	8,628	3,453	4,291	287	6,614

Table 101.--Timber products from roundwood by species group and product, Kansas, 1980

Species group	All products	Saw logs		Veneer logs		Fuelwood		Posts		Cooperage logs	
	Thousand cubic feet	Thousand board feet[1/]	Thousand cubic feet	Thousand board feet[1/]	Thousand cubic feet	Cords	Thousand cubic feet	Thousand pieces	Thousand cubic feet	Thousand board feet[1/]	Thousand cubic feet
SOFTWOODS											
Eastern redcedar	92	321	66	--	--	--	--	35	26	--	--
Total	92	321	66	--	--	--	--	35	26	--	--
HARDWOODS											
White oak	4,669	3,225	569	59	12	57,573	4,030	26	14	264	44
Red oak	3,645	2,931	521	--	--	44,427	3,111	27	13	--	--
Hickory	545	74	11	--	--	7,650	534	--	--	--	--
Pecan	57	348	57	--	--	--	--	--	--	--	--
Hard maple	25	--	--	--	--	400	25	--	--	--	--
Soft maple	779	1,543	246	--	--	7,650	533	--	--	--	--
Ash	2,685	2,183	367	--	--	33,150	2,318	--	--	--	--
Cottonwood	1,832	6,107	940	--	--	12,750	892	--	--	--	--
Basswood	18	10	1	--	--	250	17	--	--	--	--
Elm	1,116	1,458	222	--	--	12,750	894	--	--	--	--
Black walnut	1,609	8,955	1,362	478	69	2,550	178	--	--	--	--
Hackberry	1,931	3,193	504	--	--	20,400	1,427	--	--	--	--
Sycamore	397	1,417	218	--	--	2,550	179	--	--	--	--
Other hardwoods[2/]	3,873	121	18	--	--	52900	3,705	262	150	--	--
Total	23,181	31,565	5,036	537	81	255,000	17,843	315	177	264	44
All species	23,273	31,886	5,102	537	81	255,000	17,843	350	203	264	44

[1/] International 1/4-inch rule.

[2/] Includes willow and boxelder species groups.

Table 102.--Volume of primary plant residue by type of use and kind of material, Kansas, 1980

(In thousand cubic feet)

Type of use	Kind of wood residue							
	Total		Coarse[1/]		Fine[2/]		Bark	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Fiber products	--	298.1	--	298.1	--	--	--	--
Industrial fuel	--	677.8	--	433.3	--	244.5	--	279.8
Domestic fuel	11.2	577.0	10.6	536.5	0.6	40.5	3.7	335.4
Miscellaneous[3/]	6.1	469.6	0.2	13.0	5.9	456.6	0.1	7.2
Not used[4/]	6.3	664.8	4.1	413.8	2.2	251.0	1.5	455.1
Total	23.6	2,687.3	14.9	1,694.7	8.7	992.6	5.3	1,077.5

[1/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3/] Livestock bedding, mulch, small dimension, charcoal, and specialty items.

[4/] Includes residue burned as waste.

Table 103.--All live shrub biomass yields on commercial forest land by species group and forest type, Kansas, 1981

(In pounds per acre green weight)

Species	Forest type									
	Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
TALL SHRUBS										
Eastern redcedar	244	11	2	13	3	--	--	--	9	--
Boxelder	--	--	--	--	13	39	--	10	--	--
Silver maple	--	--	--	--	10	--	--	--	--	--
Sugar maple	--	3	--	--	2	--	--	--	5	--
Ailanthus	--	75	--	--	--	--	--	--	--	--
Bitternut hickory	--	14	5	12	--	--	--	8	--	--
Shagbark hickory	5	14	--	2	--	--	--	--	1	--
Hackberry	--	29	5	18	20	1	--	107	3	2
Eastern redbud	--	34	20	44	23	--	--	9	16	--
Roughleaf dogwood	1,411	215	55	164	253	239	1,778	173	561	92
Hawthorn	--	12	--	--	14	--	--	--	3	--
White ash	--	8	--	--	--	--	--	--	4	--
Green ash	--	118	1	12	19	82	--	136	15	--
Honeylocust	1	8	--	18	29	--	--	8	30	6
Black walnut	--	13	--	25	3	--	--	12	5	--
Osage-orange	--	5	--	28	1	--	--	--	7	6
Red mulberry	--	5	2	3	7	37	177	2	9	--
Eastern hophornbeam	--	18	4	3	--	--	--	--	--	--
Eastern cottonwood	--	--	--	--	4	--	--	--	--	--
Black cherry	--	3	--	11	--	--	--	--	1	3
Chokecherry	--	11	--	2	2	30	--	11	4	--
Wild plum	--	--	--	--	3	--	--	3	2	--
Pawpaw	--	7	--	15	2	--	--	21	--	--
White oak	--	--	46	--	--	--	--	--	--	--
Bur oak	--	4	1	1	--	--	--	4	--	--
Chinkapin oak	24	15	1	5	--	--	--	10	5	--
Northern red oak	5	8	8	--	--	--	--	2	8	--
Black oak	1	5	--	--	--	--	--	--	10	--
Beaked hazel	931	32	--	--	--	--	--	25	--	--
Prickly ash	--	--	--	30	58	--	--	--	3	--
Viburnum	--	5	--	1	--	--	--	--	--	--
Elder	--	6	--	--	19	--	--	--	--	--
Sumac	39	22	28	1	7	--	--	4	49	70
Buttonbush	--	--	--	--	2	--	--	--	--	--
Wahoo	--	4	--	--	--	--	--	2	--	--
Willow	--	--	--	--	29	28	694	1	--	3
Sassafras	--	2	--	--	--	--	--	--	--	--
American basswood	--	3	--	15	--	2	--	--	--	--
American elm	46	66	22	49	39	--	--	148	108	7
Siberian elm	--	5	--	--	--	--	--	--	--	--
Slippery elm	--	54	--	21	20	16	--	26	34	--
Total	2,707	834	200	493	582	474	2,649	722	892	189

(Table 103 continued on next page)

(Table 103 continued)

Species	Forest type									
	Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
LOW SHRUBS										
Virginia creeper	2	7	3	1	--	30	--	3	--	--
Gooseberry-currant	--	8	--	--	12	2	--	9	2	--
Raspberry-blackberry	--	--	1	--	--	--	8	1	3	--
Rose	--	3	--	--	1	--	--	--	6	4
American bladdernut	--	3	--	--	1	--	--	--	--	--
Bilberry-blueberry	--	2	--	--	--	--	--	--	--	--
Honeysuckle	--	--	--	7	7	13	--	6	2	--
Buckbrush	58	119	186	166	128	18	129	150	155	59
Poison ivy	--	6	2	2	10	58	--	8	4	6
Pipe-vine	--	--	2	1	--	--	--	--	--	--
Moonseed	--	4	--	--	1	--	--	3	--	--
Greenbrier	--	--	--	--	--	3	--	1	1	--
Grape	--	--	--	--	--	2	--	2	--	--
Total	60	152	194	177	160	126	137	183	173	69
All shrub species	2,767	986	394	670	742	600	2,786	905	1,065	258
Number of plots[1/]	20	265	26	42	206	32	4	213	90	33

[1/] Number of plots by forest type from which average yields were derived.

Table 104.--All live tree biomass yields on commercial forest land by species group and forest type, Kansas, 1981

(In pounds per acre green weight)

Species	Forest type									
	Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
SOFTWOODS										
Eastern redcedar	13,952	253	--	1,136	28	--	--	225	519	218
Total	13,952	253	--	1,136	28	--	--	225	519	218
HARDWOODS										
Bur oak	1,310	13,214	1,831	10,067	2,209	--	--	10,714	522	1,586
Select white oak	5,363	16,310	235	3,338	831	--	--	999	1,243	--
Other white oak	2,824	2,952	69,507	790	--	--	--	--	62	--
Select red oak	294	15,010	4,359	1,743	909	--	--	1,605	1,835	175
Other red oak	--	9,742	10,794	959	548	53	--	719	488	663
Select hickory	523	6,233	1,444	658	762	--	--	698	688	149
Other hickory	--	3,273	1,289	1,985	611	--	--	1,831	145	--
Pecan	--	3,185	--	315	621	--	--	95	349	--
Hard maple	--	935	--	--	472	--	--	79	364	--
Soft maple	--	127	--	--	5,336	388	--	1,877	186	148
Ash	597	3,014	--	2,354	17,211	2,504	5,626	5,155	3,565	2,161
Cottonwood	113	452	--	1,305	11,942	131,993	8,327	1,951	1,850	2,236
Basswood	--	1,082	--	3,152	188	1,266	--	319	447	--
Elm	2,899	4,530	913	7,587	10,127	1,787	1,534	7,445	11,455	6,111
Black walnut	3,832	4,845	1,105	16,248	2,555	842	--	14,537	3,238	386
Willow	--	113	--	107	4,065	1,925	40,718	360	557	377
Boxelder	--	205	--	713	5,834	1,781	1,741	2,875	406	1,153
Hackberry	1,232	2,504	274	13,739	6,751	1,522	170	29,074	3,111	1,528
Sycamore	--	924	--	619	2,375	477	--	3,595	553	254
Other hardwoods	1,561	2,473	516	6,651	9,389	8,505	1,498	8,726	9,315	7,547
Noncommercial species	7,163	3,541	429	11,043	4,955	45	--	3,816	5,448	6,534
Total	27,711	94,664	92,696	83,373	87,691	153,088	59,614	96,470	45,827	31,008
All species	41,663	94,917	92,696	84,509	87,719	153,088	59,614	96,695	46,346	31,226
Number of plots[1/]	20	265	27	42	206	37	4	213	90	33

[1/] Number of plots by forest type from which average yields were derived.

Table 105.--All live tree biomass on commercial forest land by species group and forest type, Kansas, 1981

(In green tons)

Species	All types	Forest type									
		Eastern redcedar-hardwood	Oak-hickory	Post-blackjack oak	Upland plains hardwoods	Elm-ash-cottonwood	Cottonwood	Willow	Lowland plains hardwoods	Upland elm-ash-locust	Non-stocked
SOFTWOODS											
Eastern redcedar	327,473	191,845	40,070	--	28,064	4,008	--	--	29,936	28,607	4,943
Total	327,473	191,845	40,070	--	28,064	4,008	--	--	29,936	28,607	4,943
HARDWOODS											
Bur oak	4,195,728	18,006	2,091,706	28,289	248,662	319,853	--	--	1,424,444	28,772	35,996
Select white oak	3,063,270	73,746	2,581,779	3,628	82,460	120,304	--	--	132,779	68,574	--
Other white oak	1,602,916	38,832	467,252	1,073,883	19,513	--	--	--	--	3,436	--
Select red oak	2,940,607	4,037	2,375,982	67,344	43,040	131,694	--	--	213,358	101,190	3,962
Other red oak	1,951,281	--	1,542,203	166,773	23,692	79,286	1,794	--	95,554	26,937	15,042
Select hickory	1,276,927	7,190	986,708	22,309	16,241	110,375	--	--	92,792	37,933	3,379
Other hickory	926,926	--	518,191	19,908	49,021	88,421	--	--	243,396	7,989	--
Pecan	633,788	--	504,246	--	7,786	89,917	--	--	12,575	19,264	--
Hard maple	246,808	--	147,954	--	--	68,317	--	--	10,448	20,089	--
Soft maple	1,069,121	--	20,155	--	--	772,645	13,213	--	249,481	10,270	3,357
Ash	4,063,618	8,210	477,086	--	58,152	2,492,180	85,263	11,814	685,297	196,554	49,062
Cottonwood	6,758,532	1,560	71,515	--	32,237	1,729,227	4,494,369	17,486	259,323	102,048	50,767
Basswood	386,444	--	171,258	--	77,858	27,178	43,118	--	42,362	24,670	--
Elm	4,249,130	39,858	717,096	14,107	187,401	1,466,383	60,844	3,221	989,815	631,686	138,719
Black walnut	3,756,931	52,690	766,988	17,073	401,339	369,970	28,655	--	1,932,843	178,600	8,773
Willow	847,383	--	17,939	--	2,632	588,569	65,544	85,509	47,907	30,718	8,565
Boxelder	1,390,074	--	32,515	--	17,602	844,819	60,639	3,657	382,291	22,376	26,175
Hackberry	5,858,598	16,942	396,428	4,240	339,359	977,604	51,832	358	3,865,563	171,587	34,685
Sycamore	1,035,946	--	146,290	--	15,292	343,938	16,250	--	477,916	30,488	5,772
Other hardwoods	4,082,630	21,463	391,456	7,972	164,268	1,359,554	289,607	3,145	1,160,155	513,686	171,324
Noncommercial species	2,613,645	98,496	560,570	6,633	272,761	717,505	1,519	--	507,371	300,481	148,309
Total	52,950,303	381,030	14,985,317	1,432,159	2,059,316	12,697,739	5,212,647	125,190	12,825,670	2,527,348	703,887
All species	53,277,776	572,875	15,025,387	1,432,159	2,087,380	12,701,747	5,212,647	125,190	12,855,606	2,555,955	708,830

Table 106.--All live tree biomass weight by species group and tree biomass component, Kansas, 1981

(In green tons)

Species group	All components	Biomass component				
		1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
SOFTWOODS						
Eastern redcedar	327,473	185,195	76,966	39,582	16,506	9,224
Total	327,473	185,195	76,966	39,582	16,506	9,224
HARDWOODS						
Bur oak	4,195,728	94,805	2,185,284	1,090,531	501,823	323,285
Select white oak	3,063,270	208,450	1,240,484	603,806	645,782	364,748
Other white oak	1,602,916	302,447	722,386	337,549	149,595	90,939
Select red oak	2,940,607	127,093	1,626,511	806,614	199,869	180,520
Other red oak	1,951,281	113,136	995,059	513,525	194,493	135,068
Select hickory	1,276,927	214,208	636,484	296,069	76,937	53,229
Other hickory	926,926	207,121	429,551	199,223	58,796	32,235
Pecan	633,788	55,007	325,064	158,518	59,919	35,280
Hard maple	246,808	80,305	100,799	51,224	9,013	5,467
Soft maple	1,069,121	37,415	568,119	280,018	98,492	85,077
Ash	4,063,618	643,970	1,798,134	950,412	395,050	276,052
Cottonwood	6,758,532	42,901	4,089,652	1,992,493	350,178	283,308
Basswood	386,444	71,834	160,590	78,287	45,154	30,579
Elm	4,249,130	1,675,863	954,679	460,438	716,885	441,265
Black walnut	3,756,931	462,570	1,810,684	897,619	359,420	226,638
Willow	847,383	70,076	363,096	182,509	129,187	102,515
Boxelder	1,390,074	181,341	325,485	161,496	412,301	309,451
Hackberry	5,858,598	897,608	2,696,133	1,312,562	589,163	363,132
Sycamore	1,035,946	36,229	621,590	293,367	45,665	39,095
Other hardwoods	4,082,630	897,973	1,065,951	520,732	967,516	630,458
Noncommercial species	2,613,645	1,077,736	--	--	1,013,171	522,738
Total	52,950,303	7,498,088	22,715,735	11,186,992	7,018,409	4,531,079
All species	53,277,776	7,683,283	22,792,701	11,226,574	7,034,915	4,540,303

Table 107.--All live tree biomass volume by species group and tree biomass component, Kansas, 1981

(In thousand cubic feet)

Species group	All components	Biomass component				
		1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
SOFTWOODS						
Eastern redcedar	17,701	10,010	4,160	2,140	892	499
Total	17,701	10,010	4,160	2,140	892	499
HARDWOODS						
Bur oak	368,784	34,164	179,043	89,298	40,528	25,751
Select white oak	109,230	7,157	43,999	21,433	23,271	13,370
Other white oak	56,862	10,384	25,633	11,992	5,449	3,404
Select red oak	103,985	4,364	56,954	28,258	7,408	7,001
Other red oak	68,077	3,829	34,501	17,850	6,940	4,957
Select hickory	44,514	7,249	22,187	10,323	2,783	1,972
Other hickory	32,220	7,009	15,003	6,961	2,087	1,160
Pecan	27,992	2,290	14,413	7,030	2,677	1,582
Hard maple	9,386	3,022	3,846	1,956	349	213
Soft maple	46,315	1,615	24,462	12,060	4,322	3,856
Ash	174,828	27,287	77,186	40,845	17,208	12,302
Cottonwood	294,105	1,818	177,508	86,499	15,405	12,875
Basswood	19,326	3,556	8,028	3,915	2,275	1,552
Elm	167,526	65,145	37,546	18,117	28,636	18,082
Black walnut	136,037	16,867	65,030	32,282	13,254	8,604
Willow	36,529	2,917	15,540	7,815	5,658	4,599
Boxelder	66,021	8,280	15,350	7,619	19,703	15,069
Hackberry	250,191	37,361	115,285	56,136	25,467	15,942
Sycamore	41,662	1,456	24,869	11,739	1,907	1,691
Other hardwoods	174,256	37,481	45,228	22,111	41,738	27,698
Noncommercial species	110,226	44,859	--	--	43,067	22,300
Total	2,338,072	328,110	1,001,611	494,239	310,132	203,980
All species	2,355,773	338,120	1,005,771	496,379	311,024	204,479

Table 108.--Removals,[1] net annual growth, and inventory of growing stock on commercial forest land, Kansas, 1981 and low removals option projections[2] to 2011.

(In million cubic feet)

Year	All species		
	Removals	Growth	Inventory
1981	14.0	23.2	711.3
1991	16.0	32.2	845.8
2001	21.1	35.0	1,001.7
2011	25.8	31.4	1,098.2

[1]Timber removals include volume "lost" due to land clearing, flooding, thinning, or changes in land use, in addition to timber cut and used.

[2]Based on the following assumptions: (a) that the overall removals rate will be lower than that for the high removals option; (b) that the annual removals rates will differ for each 5-year period but that timber removals will increase at an average annual rate of 2.766 percent; (c) that the area of commercial forest land will decline but at an insignificant rate; (d) that radial growth will decline over time in relation to the increase of basal area per acre of trees; (e) that the intensity of forest management practised will continue at the rate indicated by recent trends; and (f) that the volume of "other" removals will drop during the period as more of these trees are utilized.

Table 109.--Removals,[1] net annual growth, and inventory of growing stock on commercial forest land, Kansas, 1981 and high removals option projections[2] to 2011.

(In million cubic feet)

Year	All species		
	Removals	Growth	Inventory
1981	14.0	23.2	711.3
1991	18.7	32.1	830.8
2001	27.2	35.5	944.7
2011	37.2	34.4	969.3

[1]Timber removals include volume "lost" due to land clearing, flooding, thinning, or changes in land use, in addition to timber cut and used.

[2]Based on the following assumptions: (a) that the overall removals rate will be higher than that for the low removals option; (b) that the annual removals rates will differ for each 5-year period but that timber removals will increase at an average annual rate of 5.338 percent; (c) that the area of commercial forest land will decline but at an insignificant rate; (d) that radial growth will decline over time in relation to the increase of basal area per acre of trees; (e) that the intensity of forest management practised will continue at the rate indicated by recent trends; and (f) that the volume of "other" removals will drop during the period as more of these trees are utilized.

Table 110.--Sampling errors[1/] for estimates smaller than the State totals[2/] of volume, net growth, removals, and area of commercial forest land, Kansas, 1981

Sampling error	Commercial forest area	Growing Stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	- - - Million cubic feet - - -			- - - Million board feet[3/] - - -		
1	7,250.4	8,813.5	825.4	4,046.0	46,135.7	3,349.3	21,493.3
2	1,812.6	2,203.4	206.3	1,011.5	11,533.9	837.3	5,373.3
3	805.6	979.3	91.7	449.6	5,126.2	372.1	2,388.1
4	453.2	550.8	51.6	252.9	2,883.5	209.3	1,343.3
5	290.0	352.5	33.0	161.8	1,845.4	134.0	859.7
10	72.5	88.1	8.3	40.5	461.4	33.5	214.9
15	32.2	39.2	3.7	18.0	205.0	14.9	95.5
20	18.1	22.0	2.1	10.1	115.3	8.4	53.7
25	11.6	14.1	1.3	6.5	73.8	5.4	34.4
50	2.9	3.5	0.3	1.6	18.5	1.3	8.6
100	0.7	0.9	0.1	0.4	4.6	0.3	2.1

[1/] At the 68-percent probability level.

[2/] Sampling errors for State totals are shown in the accuracy section of the Appendix.

[3/] International 1/4-inch rule.

Table 111.--Sampling errors[1/] for estimates smaller than the Survey Unit totals[2/] of volume, net growth, removals, and area of commercial forest land, Northeastern Survey Unit, Kansas, 1981

Sampling error	Commercial forest area	Growing Stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	- - - Million cubic feet - - -			- - - Million board feet[3/] - - -		
4	367.0	--	--	--	--	--	--
5	234.9	292.8	--	--	--	--	--
10	58.7	73.2	6.3	--	384.3	23.4	--
15	26.1	32.5	2.8	--	170.8	10.4	--
20	14.7	18.3	1.6	--	96.1	5.8	--
25	9.4	11.7	1.0	--	61.5	3.7	--
50	2.3	2.9	0.3	1.7	15.4	0.9	9.5
100	0.6	0.7	0.1	0.4	3.8	0.2	2.4

[1/] At the 68-percent probability level.

[2/] Sampling errors for Survey Unit totals are shown in the accuracy section of the Appendix.

[3/] International 1/4-inch rule.

Table 112.--Sampling errors[1/] for estimates smaller than the Survey Unit totals[2/] of volume, net growth, removals, and area of commercial forest land, Southeastern Survey Unit, Kansas, 1981

Sampling error	Commercial forest area	Growing Stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	- - - Million cubic feet - - -			- - - Million board feet[3/] - - -		
4	413.3	--	--	--	--	--	--
5	264.5	--	--	--	--	--	--
10	66.1	69.5	7.3	--	338.3	26.8	--
15	29.4	30.9	3.3	--	150.4	11.9	--
20	16.5	17.4	1.8	--	84.6	6.7	--
25	10.6	11.1	1.2	--	54.1	4.3	--
50	2.6	2.8	0.3	2.0	13.5	1.1	10.0
100	0.7	0.7	0.1	0.5	3.4	0.3	2.5

[1/] At the 68-percent probability level.

[2/] Sampling errors for Survey Unit totals are shown in the accuracy section of the Appendix.

[3/] International 1/4-inch rule.

Table 113.--Sampling errors[1/] for estimates smaller than the Survey Unit totals[2/] of volume, net growth, removals, and area of commercial forest land, Western Survey Unit, Kansas, 1981

Sampling error	Commercial forest area	Growing Stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	- - - Million cubic feet - - -			- - - Million board feet[3/] - - -		
10	129.9	--	--	--	--	--	--
15	57.7	115.1	--	--	563.1	--	--
20	32.5	64.8	--	--	316.7	7.0	--
25	20.8	41.4	2.5	--	202.7	4.5	--
50	5.2	10.4	0.6	1.6	50.7	1.1	4.8
100	1.3	2.6	0.2	0.4	12.7	0.3	1.2

[1/] At the 68-percent probability level.

[2/] Sampling errors for Survey Unit totals are shown in the accuracy section of the Appendix.

[3/] International 1/4-inch rule.

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Spencer, John S., Jr.; Strickler, John K.; Moyer, William J.
Kansas forest inventory, 1981. Resour. Bull. NC-83. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1984. 134 p.

The third inventory of the timber resource of Kansas shows a 1.4-percent increase in commercial forest area and a 42-percent gain in growing-stock volume between 1965 and 1980. Text and statistics are presented on area, volume, growth, mortality, removals, utilization, biomass, and future timber supply.

KEY WORDS: Area, timber volume, growth, mortality, removals.

United States Department of Agriculture

Forest Service

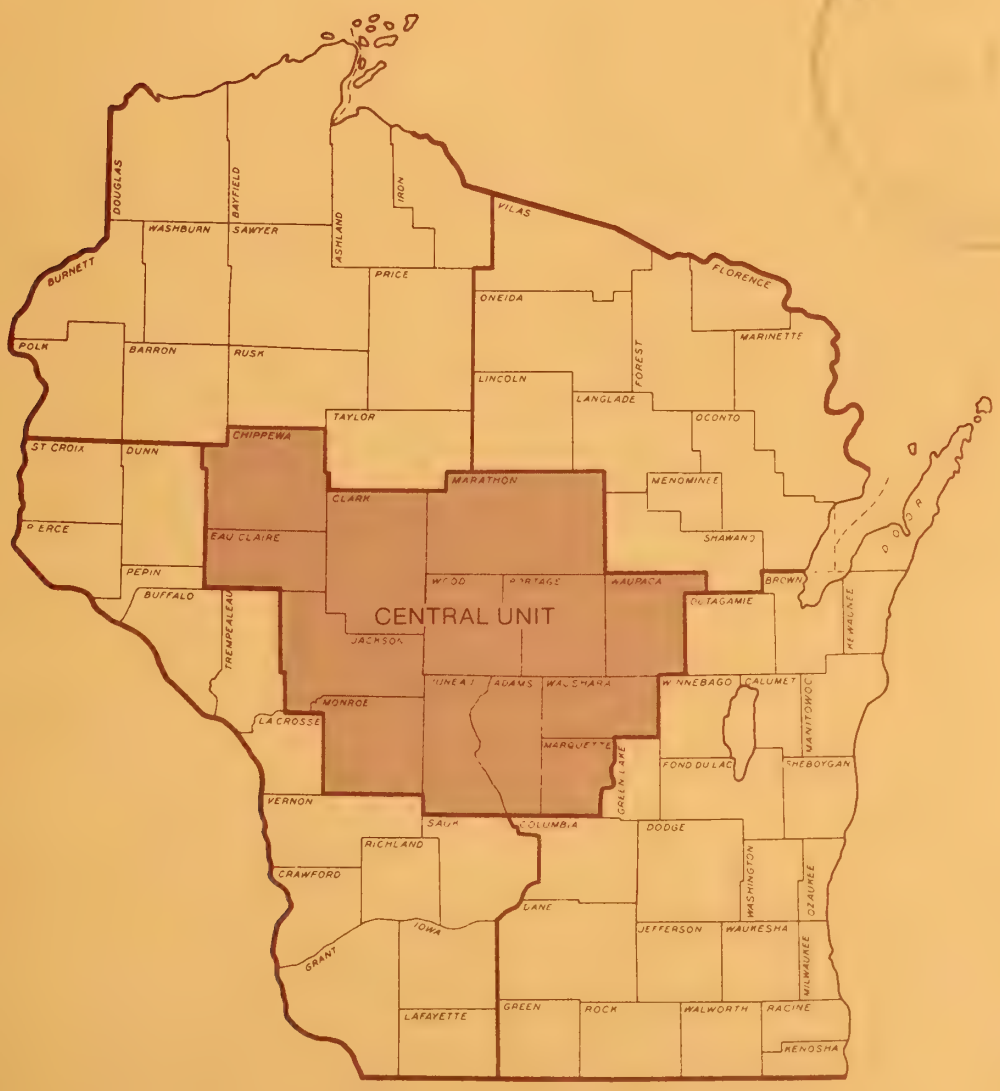
North Central Forest Experiment Station

Resource ~~Research~~

Bulletin **NC-84**

Timber Resource of Wisconsin's Central Survey Unit, 1983

Jerold T. Hahn



Information contained in this report includes the most commonly used Forest Inventory and Analysis statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information that can be provided from the raw inventory data are expected to pay for the retrieval costs. These costs will vary depending on the complexity of the request, from less than $100 for a relatively simple request to $2,000 for a complex retrieval involving the services of a Forest Inventory and Analysis computer programmer. If requests for data conflict with ongoing Forest Inventory and Analysis work, they will be scheduled so as to minimize the impact on the work unit.

Requests for unpublished information may be directed to:

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North Central Forest Experiment Station
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St. Paul, Minnesota 55108

Phone: (612) 642-5282

Area served: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, Wisconsin.

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Manuscript approved for publication October 28, 1984
1985

FOREWORD

Forest Inventory and Analysis (FIA) is a continuing endeavor as mandated by the Renewable Forest and Rangeland Resources Planning Act of 1974. Prior inventories were mandated by the McSweeney-McNary Forest Research Act of 1928. The objective of FIA is to periodically inventory the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. Up-to-date resource information is essential to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for forest resource evaluation in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, and Wisconsin.

Fieldwork for the Wisconsin Statewide forest inventory was begun in the summer of 1981 and completed in late 1983. Reports on the three previous inventories of Wisconsin's timber resource are dated 1936, 1956, and 1968.

More accurate survey information was obtained during the 1983 survey than otherwise would have been feasible because of intensified field sampling. Such sampling was made possible by additional funding and field personnel provided the North Central Station by the Wisconsin State Legislature through the Department of Natural Resources. Data from the Departments' canvass of all primary wood-using plants in the State was used to help estimate the quantity of timber products harvested in Wisconsin.

Aerial photos used in the Central Unit Forest Inventory were furnished by the Wisconsin Department of Natural Resources and the USDA Agricultural Stabilization and Conservation Service.

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TIMBER RESOURCE OF WISCONSIN'S CENTRAL SURVEY UNIT, 1983

Jerold T. Hahn, *Principal Mensurationist*

HIGHLIGHTS

Forest Area

- Forest land accounted for 3.0 million acres (42 percent of the Unit's land area) in 1983, this constitutes a 5.1 percent increase since 1968.
- Commercial forest land occupied 2.95 million acres in 1983--an increase of 4.2 percent from the 2.83 million acres in 1968.
- Productive-reserved forest land totaled 30,100 acres in 1983, compared to 3,900 acres in 1968. Major additions since 1968 include an increase in the number and area of State and county parks (14,200 acres in 1983), scientific and natural areas, military reservation impact areas, and Christmas tree plantations (11,000 acres).
- Jackson County contained the largest area of commercial forest in 1983 (371,400 acres); in 1968 it had 345,500 acres.
- Farmers and miscellaneous private owners continued to hold 74 percent of the commercial forest (2.1 million acres in 1968 and 2.2 million acres in 1983). A new definition of farm ownership shifted much of what was previously in the farmer category to the miscellaneous private category.
- County and municipal agencies owned 399,300 acres of commercial forest in 1983 (14 percent).
- The oak-hickory forest type continued to dominate the commercial forest land base in 1983, comprising 32 percent (937,600 acres) of the commercial forest area.
- The maple-birch type increased 30 percent to 506,200 acres while the aspen type decreased 16 percent to 577,500 acres.
- Sapling and seedling stands occupied 30 percent of the commercial forest in 1983, compared to 38 percent in 1968.
- Sawtimber stands, which increased by 330,700 acres between surveys, amounted to 30 percent of the commercial forest in 1983, compared to 19 percent in 1968.
- Sixty-four percent (114,900 acres) of the commercial plantation area is in the red pine type. This is 85 percent of the total area (135,000 acres) in red pine.
- Sixty-five percent (116,800 acres) of the plantations are less than 30 years old.
- Ten percent of all commercial forest area has white pine as prominent conifer in the understory, and 8 percent has jack pine as prominent conifer in the understory.
- Less than 2 percent of all forest land is unproductive or reserved.
- The average site index for commercial forest land in the Unit is 64 feet at age 50.

Timber Volume

- The volume of growing stock in 1983 was 2.87 billion cubic feet, 75 percent greater than the 1.64 billion in 1968.
- Sawtimber volume amounted to 6.3 billion board feet in 1983, 94 percent greater than the 1968 volume (3.2 billion board feet).
- The 2.2 billion cubic feet of hardwoods make up 75 percent of the growing-stock volume.
- Red pine growing-stock volume increased 609 percent since 1968. Ingrowth of plantations to merchantable size was the dominant factor in this dramatic increase. Area of red pine sawtimber increased from 7,500 acres to 20,900 acres, and red pine poletimber increased from 20,100 acres to 77,100 acres.
- The oaks (814 million cubic feet), aspens (505 million), and pines (595 million) contain the highest volumes, and together account for nearly 67 percent of the growing-stock volume.
- Average growing-stock volume per acre in 1983 was 972 cubic feet, compared to 580 cubic feet in 1968.
- Forty-five percent of the growing-stock volume is in stands from 31- to 60-years old.
- More than half of the sawtimber volume is in trees with grade 3 butt logs. Tree diameter is generally the limiting criterion.

- The volume in cull trees (rough, rotten, and short-log cull) is 528 million cubic feet; salvable dead tree volume is 45 million cubic feet.

Stand Conditions

- Net annual growth on growing-stock trees was 100 million cubic feet in 1982.
- The net annual growth rate of growing stock was 3.5 percent of inventory in 1982.
- Net growth averaged 33.9 cubic feet per acre in 1982.
- Annual mortality of growing stock amounted to 24.2 million cubic feet (0.8 percent of inventory) in 1982.
- Disease accounted for 23 percent of the mortality in 1982, chiefly diseases of aspen and elm.
- Elm mortality resulted in a 57 percent decline in elm volume between inventories, chiefly due to the effects of Dutch elm disease.

Timber Use

- Timber removals from growing stock in 1982 totaled over 48 million cubic feet (1.7 percent of inventory), compared to 42 million cubic feet (2.6 percent of inventory) in 1967.
- The pines made up 26 percent of the 1982 removals volume, although they account for only 21 percent of the growing-stock volume.
- Output of roundwood products from growing stock totaled 43.3 million cubic feet in 1981; 47 percent was pulpwood, 14 percent was fuelwood, and 37 percent was saw logs.
- Wood residue from primary plants totaled 8.6 million cubic feet in 1981, 97 percent of which was used.

Biomass

- Highest yields of live tree biomass are in the northern white cedar (82 green tons per acre), the white pine (82 tons), and the red pine (78 tons) forest types.
- Live tree biomass (trees greater than 1 inch d.b.h.) totaled 193 million green tons (65 tons per acre) in 1983, with just under half in the boles of growing-stock trees.

APPENDIX

ACCURACY OF SURVEY

Forest inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State and Unit levels. Consequently, the reported figures are estimates only. A measure of reliability of these figures is given by sampling errors. These sampling errors mean that the chances are two out of three that if a 100-percent inventory had been taken, using the same methods, the results would have been within the limits indicated.

For example, the estimated growing-stock volume in the Central Unit in 1983, 2,868.9 million cubic feet, has a sampling error of ± 2.72 percent (± 78.0 million cubic feet). The growing-stock volume from a 100-percent inventory would be expected to fall between 2,946.9 and 2,790.9 million cubic feet (2,868.9 ± 78.0), there being a one in three chance that this is not the case.

The following tabulation shows the sampling errors for the 1983 Central Unit Forest Inventory:

Item	Unit totals	Sampling error
Growing stock	(Million cubic feet)	(Percent)
Volume	2,868.9	2.72
Growth	100.2	3.73
Removals	48.2	26.52
Sawtimber	(Million board feet[1])	
Volume	6,295.7	3.92
Growth	267.7	4.86
Removals	148.4	27.36
Commercial forest land	(Thousand acres) 2,950.9	0.35

As survey data are broken down into sections smaller than Survey Unit totals, the sampling error increases. For example, the sampling error for growing-stock volume in a particular county is higher than that for total growing-stock volume in the Unit (table 66 shows the sampling errors for estimates smaller than Unit totals).

[1] *International ¼-inch rule.*

SURVEY PROCEDURES

We used a two-phase sampling design for the 1983 Wisconsin survey. This sampling scheme and associated estimators are similar to sampling with partial replacement (SPR) in that a set of randomly located plots was available for remeasurement and a set of new randomly located plots was established and measured. Major enhancements in the new Wisconsin design were stratification for disturbance on the old sample and use of a growth model to improve regression estimates made on the old undisturbed forest plots. The growth model used was the Stand and Tree Evaluation and Modeling System (STEMS).[2]

The major steps in the new survey design were as follows:

1. The first phase of the survey was to interpret aerial photos. In this phase two sets of random points were located on current aerial photographs. The first was a set of new photo points and the second was a set of relocated old photo points (ground plot locations from the previous inventory). A total of 41,492 1-acre points, including old ground sample locations, was systematically distributed across aerial photos of the entire Unit. These points were classified into land classes as shown below to make a preliminary estimate of forest area. Next, 19,278 of these points were stereoclassified as to stand-size class and density. Finally, 3,195 points were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken.

Land class	Photo points classified	Photo points stereoclassified	Inventory plots checked
Forest land	18,363	18,363	1,372
Unproductive/ reserved forest land	134	134	16
Nonforest land with trees	781	781	48
without trees	21,535	0	1,704
Water	679	0	55
Total	41,492	19,278	3,195

2. The second phase of the survey was to sample ground plots. The plot selection and measurement procedures of phase two of the new Wisconsin survey design are outlined in figure 1.

From the new photo points, a random sample of ground plots was established and land use, volume, mortality, and cutting were recorded. At each forest ground plot location, variable-radius plots (basal area factor 37.5) were established at 10 points uniformly placed over the sample acre. These locations were monumented for future remeasurement.

On the old inventory photo points (old plot locations), we used a somewhat different procedure. Old plots were either remeasurable (monumented) or nonremeasurable (not monumented and thus difficult to relocate). Within both of these groups, old plots were additionally identified as undisturbed or disturbed. The remeasurable old inventory photo points classified as forest undisturbed were remeasured on the ground to obtain current land use, volume, growth, and removals data. Additionally, all forest undisturbed remeasurable plots were projected to the current time using STEMS to provide estimates of current volume and growth. The comparison of projected and observed values on these plots provided regression estimators to adjust the projected values of the undisturbed nonremeasurable plots. All disturbed remeasurable plots were remeasured on the ground to assess changes since the last inventory.

Disturbance as used here refers to any change on a plot that can be detected on aerial photos and that the STEMS growth processor cannot predict, such as catastrophic mortality, cutting, seedling stands, and land use change.

The nonremeasurable forest points are those that were not monumented during the 1968 inventory but

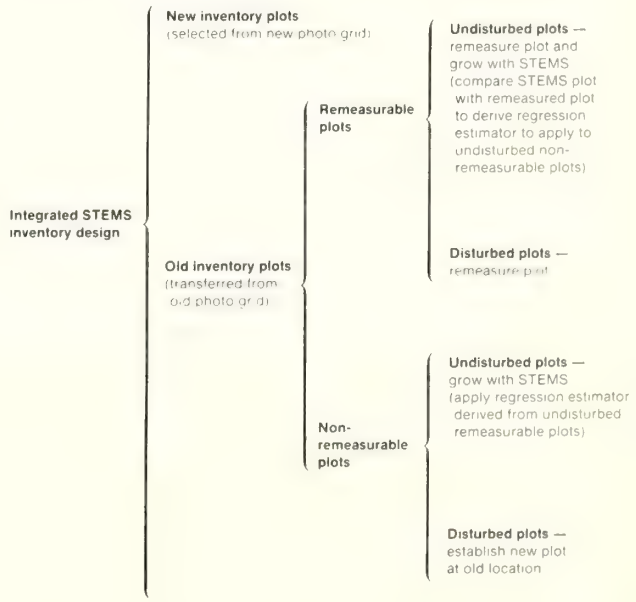
Integrated STEMS inventory design
New inventory plots
(selected from new photo grid)
Old inventory plots
(transferred from old photo grid)
Remeasurable plots
Non-remeasurable plots
Undisturbed plots — remeasure plot and grow with STEMS (compare STEMS plot with remeasured plot to derive regression estimator to apply to undisturbed non-remeasurable plots)
Disturbed plots — remeasure plot
Undisturbed plots — grow with STEMS (apply regression estimator derived from undisturbed remeasurable plots)
Disturbed plots — establish new plot at old location

Figure 1.--*Logic structure for the 1983 Wisconsin sample design.*

[2]*For more information on STEMS, see: Belcher, D. L.; Holdaway, M.R.; Brand, G.J. A description of STEMS: The stand and tree evaluation and modeling system. Gen. Tech. Rep. NC-79. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1981. 18 p.*

played a crucial role in the new survey design. The nonremeasurable undisturbed forest points were visited on the ground at the time of the last survey and following careful examination of both past and current photographs it was determined that nothing happened that STEMS was unable to simulate. STEMS was then used to update the old plot and tree data to produce an estimate of current data. Thus these points became ground plots even though the information was obtained without actually visiting the plot. The plot record for each updated plot was sent to the field for verification of current ownership information. For points classified as disturbed, a new ground plot was established as close to the old location as possible. This allowed information about land use trends to be recorded even though the old plot could not be exactly relocated for remeasurement.

The estimation procedure for computing statistics from this sampling design was more complicated than the simple two-phase estimation procedure used in the past. In fact, this procedure yielded two independent samples, one coming from the new photo points and the other coming from the old photo points that were remeasured or projected. A more detailed description of the sampling design is available in a separate publication.[3]

3. Statistics on timber utilization during 1981 were obtained from mill surveys. The Wisconsin Department of Natural Resources canvassed resident sawmills, veneer mills, and other primary wood-using plants. The North Central Forest Experiment Station canvassed out-of-State sawmills, pulpmills, and veneer mills to determine their use of Wisconsin timber. Fuelwood and fencepost output was based on a sample of public and private landowners to determine their production of fuelwood and fenceposts. Estimates of primary mill residue used for fuelwood were obtained from the canvass of Wisconsin primary wood-using plants.

4. A total of 2,568 felled trees on 133 active logging operations was measured throughout the State during 1981-1982 to develop wood utilization factors for converting timber products output to timber removals for saw logs and pulpwood. Factors for all other products were obtained during the 1966-1967 Wisconsin utilization study.

5. Field data were sent to St. Paul, Minnesota, to be processed and analyzed.

[3]*Hahn, J. T.; Hansen, M. H.; Fairweather, S. E. A Sampling procedure incorporating a growth simulator. U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. St. Paul, MN 55108.1984 (Manuscript in process).*

COMPARING WISCONSIN'S FOURTH INVENTORY WITH THE THIRD INVENTORY

Data from new forest inventories are often compared with data from earlier inventories to determine trends in forest resources. However, changes in procedures and definitions between surveys often make it necessary to adjust earlier survey data so that they are comparable to data from the new survey. A consistency check will be made for each Forest Unit in Wisconsin to ensure that the changes observed between inventories reflect actual changes in the resource and not changes in definitions or procedures.

Identifying and Correcting Procedural Changes

Between the 1968 and 1983 inventories of Central Wisconsin, some procedural changes were made in the method of deriving annual mortality estimates and determining forest type; revised volume equations were used.

Mortality figures for the 1968 inventory were based on field estimates from nonremeasurement plots. Information gathered on remeasurement plots during the current inventory was used to adjust the 1968 mortality figures. This adjustment also changed the estimate of net growth for the 1968 inventory. Additionally, the old spruce-fir forest type was separated into two distinct types for the new industry--white spruce and balsam fir. Comparisons with old data may be made by adding the two new types together.

The difference in volume equations resulted in a 6-percent increase in reported growing-stock volume for 1968.

Checking for Consistency

A test was made to ensure that it was possible to move from the adjusted 1968 resource statistics to the 1983 values by means of Timber Resource Analysis System (TRAS), a USDA Forest Service computer program for updating, backdating, and projecting timber volume, growth, mortality, and removals. Using the adjusted 1968 numbers of softwood and hardwood trees by 2-inch diameter class and applying 1983 cubic feet per tree estimates, volumes were generated for the 1968 inventory that are comparable with 1983 volumes. Then, using growth rates, mortality rates, and removals rates for the period between the two surveys, TRAS projected the inventory from 1968 to 1983. The program prints out volumes by diameter class for softwoods and hardwoods for selected years in the period.

Thus, inconsistencies in volume, growth, mortality, and removals were identified and resolved.

TRAS generates an estimate of what total removals had to be for the inventory to have changed as it did between surveys, given the volume, growth, and mortality data. Estimates of removals for products and for logging residues, two of the three components of total timber removals, were available from an independent utilization study. An estimate of "other" removals (see Definition of Terms in Appendix), the third component of total removals, was made by subtracing the first two removals components from the TRAS-generated total removals estimate. This estimate of "other" removals was compared with findings from remeasurement plots and new plots (stump counts and land use change) to check its validity. When necessary, TRAS was rerun and adjusted until other removals were compatible with the estimate from field data. Total removals were "trend level removals" because the estimate of "other" removals was based on a removals trend line from 1968 to 1983.

LOG GRADE

In Wisconsin's Central Unit the butt log of every sawtimber tree on every full permanent sample plot was graded for quality.

Butt logs were graded on the basis of external characteristics as indicators of quality. Hardwood species were graded according to "Hardwood Log Grades for Standard Lumber."[4] The best 12-foot section of the lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log-grade standards, was graded as follows:

---

[1] *Vaughn, C. L.; Wollin, C. A.; McDonald, K. A.; Bulgrin, E. H. Hardwood log grades for standard lumber. Res. Pap. FPL 63. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1966. 52 p.*

Forest Service standard grades for hardwood factory saw logs

Grading factors		Specifications							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Scaling diameter, inches		[1]13-15	16-19	20+	[2]11+		12+		8+
Length without trim, feet			10+		10+	8-9	10-11	12+	8+
Required clear cuttings[3] of each of three best faces[4]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No Limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance	For logs with less than one-fourth of end in sound defects		15 percent			30 percent			50 percent
	For logs with more than one-fourth of end in sound defects		10 percent			20 percent			35 percent
Maximum scaling deduction			40 percent[5]			50 percent[6]			50 percent

[1]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[2]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[3]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[4]A face is one-fourth of the surface of the log as divided lengthwise.
[5]Otherwise #1 logs with 41-60 percent deductions can be #2.
[6]Otherwise #2 logs with 51-60 percent deductions can be #3.

Forest Service standard specifications for hardwood construction logs (tie and timber logs)[1]

Position in tree		Butt and upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		One-fourth of the diameter at the small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of one-third of the log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed one-third of the log diameter at point of occurrence.
	Holes	Any number provided none has a diameter over one-third of the log diameter at point of occurrence, and none extends more than 3 inches into included timber.[2]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[2] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit one shake not to exceed one-fourth the scaling diameter and will admit a longitudinal split not extending more than 5 inches into the contained timber.

[1]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only nonfactory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, it may be necessary to subdivide the class into grades.

[2]Included timber is always square, and dimension is judged from small end.

Softwood species were graded according to the following specifications on the following page.

Log Grades for Eastern White Pine

Log grade	Minimum size Diameter	Minimum size Length[1]	Sweep or crook allowance	Total cull allowance including sweep	Maximum weevil injury	Allowable knot size (inches)[2] on three best faces or minimum clearness of four faces
	Inches	*Feet*	--------*Percent*--------		*Number*	*Inches*
1	12 & 13	8-16	20	50	0	Four faces clear full length
	14 +	10-16	20	50	0	Two faces clear full length, or four faces clear 50 percent length (6 feet min. length)[3]
2	6 +	8-16	30	50	0	Sound knots l.e.[4] D/6 and less than 3 inches[5] Unsound knots: l.e. 1½ inches and for: butt, lots l.e. D/12 upper logs l.e. D/10 or four faces clear 50 percent of length
3	6 +	8-16	40	50	8-foot logs 1 weevil 10-foot + logs: 2 weevil	Sound knots l.e. D/3 and less than 5 inches. Unsound knots l.e.D/6 and less than 2½ inches.
4	6 +	8-16	50	50	No limit	No limit

[1]Plus trim.
[2]Disregard all knots less than ½-inch diameter in all grades.
[3]The sum of the diameter of sound knots plus twice the sum of the diameter of unsound knots (in inches) is less than or equal to ½ of the diameter of the log (inches).
[4]l.e. means less than or equal to.
[5]D means d.i.b. of log at location of knot.

LOG GRADES FOR JACK PINE AND RED PINE

Grade 1: logs with three or four clear faces.[5]

Grade 2: logs with one or two clear faces.

Grade 3: logs with no clear faces.

After the tentative log grade is established, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3. Net scale after deduction for defect must be at least 50 percent of the gross contents of the log.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one-third the diameter inside bark at small end.

2. *Heart rot.* Degrade any tentative 1 or 2 log grade if conk, massed hyphae, or other evidence of advance heart rot is found anywhere in it.

[5]*A face is one-fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than ½-inch in diameter, overgrown knots of any size, holes more than ¼-inch in diameter. Faces may be rotated to obtain the maximum number of clear ones.*

LOG GRADES FOR ALL OTHER SOFTWOOD LOGS

Grade 1

1. Logs must be 16 inches in diameter or larger, 10 feet or longer, and with deduction for defect not over 30 percent of gross scale.
2. Logs must be at least 75 percent clear on each of three faces.
3. All knots outside clear cutting must be sound and not over 2-½ inches in size.

Grade 2

1. Logs must be 12 inches in diameter or larger, 10 feet or longer, and with a net scale after deduction

for defect of at least 50 percent of the gross contents of the log.

2. Logs must be at least 50 percent clear on each of three faces or 75 percent clear on two faces.

Grade 3

1. Logs must be 6 inches in diameter or larger, 8 feet or longer, and with a net scale after deduction for defect of at least 50 percent of the gross contents of the log.

Note: (A) Diameters are diameter inside bark (d.i.b.) at small end of log.
(B) Percent clear refers to percent clear in one continuous section.

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 pound = 0.454 kilogram.
1 ton = 0.907 metric ton.

TREE SPECIES GROUPS IN WISCONSIN[6]

SOFTWOODS
- Jack pine ..... *Pinus banksiana*
- Red pine ..... *Pinus resinosa*
- Eastern white pine ..... *Pinus strobus*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Northern white-cedar ..... *Thuja occidentalis*
- Other softwoods
  - Eastern redcedar ..... *Juniperus virginiana*
  - Norway spruce ..... *Picea abies*
  - Scotch pine ..... *Pinus sylvestris*

HARDWOODS
- White oaks
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus macrocarpa*
  - Chinkapin Oak ..... *Quercus muehlenbergii*
- Select red oak
  - Northern red oak ..... *Quercus rubra*
- Other red oaks
  - Northern pin oak ..... *Quercus ellipsoidalis*
  - Black oak ..... *Quercus velutina*
- Select hickory
  - Shagbark hickory ..... *Carya ovata*
- Other hickory
  - Bitternut hickory ..... *Carya cordiformis*
- Yellow birch ..... *Betula alleghaniensis*
- Hard maple
  - Sugar maple ..... *Acer saccharum*
  - Black maple ..... *Acer nigrum*
- Soft maples
  - Red maple ..... *Acer rubrum*
  - Silver maple ..... *Acer saccharinum*
- Ashes
  - White ash ..... *Fraxinus americana*
  - Black ash ..... *Fraxinus nigra*
  - Green ash ..... *Fraxinus pennsylvanica*
- Balsam poplar ..... *Populus balsamifera*
- Eastern cottonwood ..... *Populus deltoides*
- Sycamore ..... *Platanus occidentalis*
- Aspens
  - Bigtooth aspen ..... *Populus grandidentata*
  - Quaking aspen ..... *Populus tremuloides*
- American basswood ..... *Tilia americana*
- Beech ..... *Fagus grandifolia*
- Black walnut ..... *Juglans nigra*
- Black cherry ..... *Prunus serotina*
- Butternut ..... *Juglans cinerea*
- Elms
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasii*
- Hackberry ..... *Celtis occidentalis*
- Paper birch ..... *Betula papyrifera*
- Black willow ..... *Salix nigra*
- Other hardwoods
  - Boxelder ..... *Acer negundo*
  - Black locust ..... *Robinia pseudoacacia*
  - Honeylocust ..... *Gladitsia triacanthos*
  - River birch ..... *Betula nigra*
  - Red mulberry ..... *Morus rubra*
  - Blackgum ..... *Nyssa silvatica*
  - Northern Catalpa ..... *Catalpa speciosa*
- Noncommercial species
  - Mountain maple ..... *Acer spicatum*
  - Eastern hophornbeam ..... *Ostrya virginiana*
  - Peachleaf willow ..... *Salix amygdaloides*

[6] *The common and scientific names are based on: Little, Elbert L. Check list of native and naturalized trees of the United States. Agric. Handb. 541. Washington, DC: U.S. Department of Agriculture, Forest Service; 1979. 375 p.*

American hornbeam .... *Carpinus caroliniana*
Hawthorn ..... *Crataegus* spp.
Striped maple ..... *Acer pensylvanicum*
Mountain ash ..... *Sorbus* spp.
Pin cherry ..... *Prunus pensylvanica*
Chokecherry ..... *Prunus virginiana*

DEFINITION OF TERMS

Basal area.--The area is square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

Biomass.--The above-ground volume of all live trees (including bark and foliage) reported in green tons. Biomass is made up of 5 components:

Growing-stock bole.--Biomass of a growing-stock tree from a 1-foot stump to a variable 4-inch top.

Growing-stock tops and limbs.--Biomass of a growing-stock tree from a 1-foot stump minus the growing-stock bole.

Cull bole.--Biomass of a cull tree from a 1-foot stump to a variable 4-inch top.

Cull tops and limbs.--Biomass of a cull tree from a 1-foot stump minus the cell bole.

1- to 5-inch trees.--Biomass of all live trees from 1- to 5-inches in diameter at breast height.

Commercial forest land.--Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land are capable of producing more than 20 cubic feet per acre per year of annual growth when managed. Currently inaccessible and inoperable areas are included except when the areas involved are small and unlikely to become suitable for producing industrial wood in the foreseeable future.) Also see definition of pastured commercial forest land.

Commercial species.--Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

County and municipal land.--Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Cull.--Portions of a tree that are unusable for industrial wood products because of rot, form, or other defect.

Diameter classes.--A classification of trees based on diameter outside bark, measured at breast height (4½ feet above the ground). (Note: D.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.)

Farm.--Either a place operated as a unit of 10 or more acres from which the sale of agricultural products totals $50 or more annually, or a place operated as a unit of less than 10 acres from which the sale of agricultural products for a year amounts to at least $250. Places having less than the $50 or $250 minimum estimated sales in a given year are also counted as farms if they can normally be expected to produce goods in sufficient quantity to meet the requirements of the definition.

Farmer-owned land.--Land owned by farm operators. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparing specified standards with basal area and/or number of trees, age or size, and spacing.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions for land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, and water.

Forest industry land.--Land owned by companies or individuals operating primary wood-using plants.

Forest trees.--Woody plants having a well-developed stem and usually more than 12 feet tall at maturity.

Forest type.--A classification of forest land based on the species forming a plurality of live tree stocking. Major forest types in the State are:

Jack pine.--Forests in which jack pine comprises a plurality of the stocking. Common associates include eastern white pine, red pine, aspen, birch, and oak.)

Red pine.--Forests in which red pine comprises a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and oak.)

White pine.--Forests in which eastern white pine comprises a plurality of the stocking. (Common associates include red pine, aspen, birch, and maple.)

Balsam fir.--Forests in which balsam fir and white spruce comprise a plurality of stocking with balsam fir the most common. (Common associates include white spruce, aspen, maple, birch, northern white-cedar, and spruce.)

White spruce.--Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include balsam fir, aspen, maple, birch, and northern white-cedar.)

Black spruce.--Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack, northern white-cedar, and balsam fir.)

Northern white-cedar.--Forests in which swamp conifers comprise a plurality of the stocking with northern white-cedar the most common. (Common associates include balsam fir, black ash, spruce, and black spruce.)

Tamarack.--Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce, balsam fir, and aspen.)

Oak-hickory.--Forests in which northern red oak, white oak, bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, aspen, birch, and maple.)

Elm-ash-soft maple.--Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include aspen, birch, and balsam fir.)

Maple-birch.--Forests in which sugar maple, basswood, yellow birch, elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, hemlock, and basswood.)

Aspen.--Forests in which quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include oak, pine, balsam fir, and paper birch.)

Paper birch.--Forests in which paper birch comprises a plurality of the stocking. (Common associates include maple, aspen, and balsam fir.)

Exotic.--Forests in which species not native to the State comprise a plurality of the stocking. (Mostly Scotch pine plantations.)

Gross area.--The entire area of land and water as determined by the Bureau of the Census, 1970.

Growing-stock trees.--Live trees of commercial species. Excluding rough and rotten dead trees.

Growing-stock volume.--Net volume in cubic feet of growing-stock trees 5 inches d.b.h. and over, from a 1-foot stump to a minimum 4 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Cubic feet can be converted to standard cords by dividing by 79. One standard cord is 128 cubic feet of stacked wood, including bark and air.

Hardwoods.--Dicotyledonous trees, usually broadleaved and deciduous.

Idle farmland.--Includes former cropland, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.--Land currently improved for grazing by cultivating, seeding, irrigating, or clearing of trees or brush and less than 16.7 percent stocked with live trees.

Indian land.--All lands held in trust by the United States for individual Indians or tribes, or all lands, titles to which are held by individual Indians or tribes, subject to Federal restrictions against alienation.

Land area.--A. *Bureau of the Census.* The area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

B. *Forest Inventory and Analysis.* The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Live trees.--Growing-stock, rough, and rotten trees 1 inch d.b.h. and larger.

Log grades.--A classification of logs based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.--The unused growing stock portions of trees cut or killed by logging.

Maintained road.--Any road, hard-topped or other surfaces, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

Marsh.--Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

Merchantable.--Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

Miscellaneous federal land.--Federal land other than National Forest, land administered by the Bureau of Land Management, and Indian land.

Miscellaneous private land.--Privately owned land other than forest-industry and farmer-owned land.

Mortality.--The volume of sound wood in growing-stock and sawtimber trees that die annually.

National Forest land.--Federal land that has been legally designated as National Forest or purchase units, and other land administered by the USDA Forest Service.

Net annual growth of growing stock.--The annual change in volume of sound wood in live sawtimber

and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.--The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.--Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.--(a) Unproductive forest land and (b) productive-reserved forest land.

Noncommercial species.--Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land.--Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide and more than 1 acre in area to qualify as nonforest land.)

a. *Nonforest land without trees*.--Nonforest land with no live trees present.

b. *Nonforest land with trees*.--Nonforest land with one or more trees per acre at least 5 inches d.b.h.

Nonstocked land.--Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other removals.--Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the commercial forest land classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership.--Property owned by one owner, regardless of the number of parcels in a specified area.

Ownership size class.--The amount of commercial forest land owned by one owner, regardless of the number of parcels.

Owner tenure.--The length of time a property has been held by the owner.

Physiographic class.--A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are:

Xeric sites.--Very dry soils where excessive drainage limits growth and species occurrence. Example: sandy jack pine plains.

Xeromesic sites.--Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

Mesic sites.--Deep, well-drained soils. Growth and species occurrence are limited only by climate.

Hydromesic sites.--Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

Hydric sites.--Very wet sites where excess water seriously limits both growth and species occurrence. Example: frequently flooded river bottoms and spruce bogs.

Plant byproducts.--Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.--Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stands.--(See stand-size class.)

Poletimber trees.--Growing-stock trees of commercial species at least 5 inches d.b.h. but smaller than sawtimber size.

Productive-reserved forest land.--Forest land sufficiently productive to qualify as commercial forest land but withdrawn from timber utilization through statute, administration regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

Productive-deferred.--Forest land sufficiently productive to qualify as commercial forest land but presently withdrawn from timber utilization because it is being considered for possible inclusion into the Wilderness system.

Rotten trees.--Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or progressively, and/or do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of extra cull volume in a tree is rotten.

Rough trees.--(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, nor or prospectively, and/or do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.--Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs, veneer logs and bolts; cooperage logs and bolts; pulpwood, fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round, split, or hewn products.)

Salvable dead trees.--Standing or down dead trees considered merchantable by regional standards.

Saplings.--Live trees 1 to 5 inches d.b.h.

Sapling-seedling stands.--(See stand-size class.)

Saw log.--A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by regional standards.

Saw log portion.--That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.--The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

Sawtimber stands.--(See stand-size class.)

Sawtimber trees.--Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting regional specifications for freedom from defect. Softwoods must be at least 9 inches d.b.h. Hardwoods must be at least 11 inches d.b.h.

Sawtimber volume.--Net volume of the saw log portion of live sawtimber in board feet, International ¼-inch rule, from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Seedlings.--Live trees less than 1 inch d.b.h. that are expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).--Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

Shrub biomass.--The total above-ground weight (including the bark) of selected shrubs and trees less than 1 inch d.b.h.

Site class.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Site index.--An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.--Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.--A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-age class.--Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.--The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.--A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

a. *Sawtimber stands*.--Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

b. *Poletimber stands*.--Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

c. *Sapling-seedling stands*.--Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

d. *Nonstocked stands*.--Stands in which stocking of growing-stock trees is less than 16.7 percent.

State land.--Land either owned by States or leased to them, for 50 years or more.

Stocking.--The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

Overstocked stands.--Stands in which stocking of trees is 134.0 percent or more.

Fully stocked stands.--Stands in which stocking of trees is from 101.0 to 133.9 percent.

Medium stocked stands.--Stands in which stocking of trees is from 61.0 to 100.9 percent.

Poorly stocked stands.--Stands in which stocking of trees is from 16.7 to 60.9 percent.

Nonstocked areas.--Commercial forest land on which stocking of trees is less than 16.7 percent.

Timber removals from growing stock.--The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals.

Timber removals from sawtimber.--The net board-foot volume of life sawtimber trees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timber products output.--All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edging, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree biomass.--The total aboveground weight (including the bark) of all trees from 1 to 5 inches in d.b.h., and the total aboveground weight (including the bark) from a 1-foot stump for trees more than 5 inches in diameter.

Tree size class.--A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

Unproductive forest land.--Forest land incapable of producing 20 cubic feet per acre of annual growth or of yielding crops of industrial wood under natural conditions because of adverse site conditions. (Note: Adverse conditions include shallow soil, dry climate, poor drainage, high elevation, steepness, and rockiness).

Upper stem portion.--That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4 inches outside bark or to the point where the central stem breaks into limbs.

Urban and other areas.--Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards; cemeteries; roads; railroads; airports; beaches; powerlines; and other rights-of-way; or other nonforest land not included in any other specified land use class.

Water.--(a) *Bureau of the Census*.--Permanent inland water surfaces, such as lakes, reservoirs, and ponds at least 40 acres in area; and streams, sloughs, estuaries, and canals at least one-eighth of a statute mile wide.

(b) *Noncensus*.--Permanent inland water surfaces, such as lakes, reservoirs, and ponds from 1 to 39.9 acres in area; and streams, sloughs, estuaries, and canals from 120 feet to one-eighth of a statute mile wide.

Wooded pasture.--Improved pasture with more than 16.7 percent stocking in live trees but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or there is other evidence of grazing.

Wooded strip.--An acre or more of natural continuous forest land that would otherwise meet survey standards for commercial forest land except that it is less than 120 feet wide.

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Table 1.--Area of land by land class, Central Unit, Wisconsin, 1968 and 1983

(In thousand acres)

Land class	1968	1983
Forest land		
Commercial forest land		
Jack pine	255.7	203.1
Red pine	68.6	135.5
White pine	59.5	77.9
Balsam fir	11.9	11.9
White spruce	2.2	2.2
Black spruce	9.0	11.6
Northern white-cedar	11.1	23.3
Tamarack	43.6	39.0
Oak-hickory	861.6	937.6
Elm-ash-soft maple	217.5	271.5
Maple-birch	390.6	506.2
Aspen	688.4	577.5
Paper birch	111.0	118.6
Exotic	--	2.2
Nonstocked	101.1	32.8
Subtotal	2,831.8	2,950.9
Noncommercial forest land		
Unproductive	21.7	21.5
Productive-reserved	3.9	30.1
Subtotal	25.6	51.6
Total	2,857.4	3,002.5
Nonforest land		
Cropland	2,489.7	2,441.0
Pasture and range	423.3	538.7
Other	1,430.9	1,188.0
Total	4,343.9	4,167.7
Total land	7,201.3	7,170.2
Water (Bureau of the Census)	111.4[1/]	114.6[2/]
Total land and water	7,312.7[1/]	7,284.8[2/]

[1/] U.S. Department of Commerce, Bureau of Census, 1960.
[2/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 2.--Area of land by land use class and county, Central Unit, Wisconsin, 1983

(In thousand acres)

Land use class	All counties	County							
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette
Forest land									
Commercial forest	2,950.9	234.3	225.7	316.1	154.5	371.4	252.1	358.5	94.3
Unproductive forest	21.5	--	2.5	--	--	4.6	--	4.8	--
Productive reserved	30.1	2.4	4.2	--	1.8	2.9	3.9	2.1	--
Total	3,002.5	236.7	232.4	316.1	156.3	378.9	256.0	365.4	94.3
Nonforest land									
Cropland with trees	9.9	--	1.7	2.2	--	2.3	--	2.3	--
Improved pasture with trees	99.4	--	4.7	9.3	4.6	2.2	6.5	22.9	2.3
Wooded strips	20.9	2.6	--	2.2	2.4	--	--	2.3	--
Idle farmland with trees	60.5	3.0	--	4.3	2.3	6.6	--	6.8	2.3
Marsh with trees	149.4	10.1	4.9	25.7	-	11.9	12.7	25.9	9.0
Urban and other windbreaks	69.1	10.8	4.5	2.2	4.1	3.0	8.5	8.6	6.7
Windbreaks	2.6	2.6	--	--	--	--	--	--	--
Wooded pasture	32.0	--	2.3	6.8	--	--	--	7.2	--
Subtotal	443.8	29.1	18.1	52.7	13.4	26.0	27.7	76.0	20.3
Nonforest without trees									
Cropland without trees	2,431.1	102.8	298.9	283.2	141.9	125.1	116.7	357.3	122.0
Improved pasture without trees	407.3	8.9	27.9	46.2	48.2	34.8	13.0	87.3	6.9
Idle farm without trees	60.3	5.9	2.5	--	4.6	2.1	2.2	--	6.9
Marsh without trees	259.6	8.5	21.0	26.4	2.4	32.5	21.7	31.4	20.7
Other farm-farmstead	88.8	5.9	2.3	17.6	6.9	2.1	--	18.0	2.3
Urban and other	449.4	16.9	44.6	35.2	34.6	30.5	54.0	55.8	16.1
Noncensus water	27.4	--	3.2	2.2	--	6.6	4.2	6.7	1.4
Subtotal	3,723.9	148.9	400.4	410.8	238.6	233.7	211.8	556.5	176.3
Total	4,167.7	178.0	418.5	463.5	252.0	259.7	239.5	632.5	196.6
Total land	7,170.2	414.7	650.9	779.6	408.3	638.6	495.5	997.9	290.9
Water (Bureau of the Census)[1/]	114.6	26.1	15.6	0.6	4.9	1.3	19.2	10.9	6.5
Total land and water[1/]	7,284.8	440.8	666.5	780.2	413.2	639.9	514.7	1,008.8	297.4

(Table 2 continued)

[1/] U.S. Department of Commerce, Bureau of Census, 1980.

(Table 2 continued)

Land use class	County				
	Monroe	Portage	Waupaca	Waushara	Wood
Forest land					
Commercial forest	245.0	174.3	172.6	145.6	206.5
Unproductive forest	2.3	--	7.3	--	--
Productive reserved	--	--	1.2	11.6	--
Total	247.3	174.3	181.1	157.2	206.5
Nonforest land					
Cropland with trees	--	--	1.4	--	--
Improved pasture with trees	6.9	10.3	3.7	12.8	13.2
Wooded strips	2.2	2.2	2.4	2.3	2.3
Idle farmland with trees	--	8.8	8.5	11.2	6.7
Marsh with trees	4.4	5.9	12.0	6.7	20.2
Urban and other windbreaks	2.2	5.8	6.2	2.3	4.2
Windbreaks	--	--	--	--	--
Wooded pasture	11.3	4.4	--	--	--
Subtotal	27.0	37.4	34.2	35.3	46.6
Nonforest without trees					
Cropland without trees	164.2	203.6	205.3	163.8	146.3
Improved pasture without trees	68.8	28.8	11.5	6.8	18.2
Idle farm without trees	4.4	8.9	9.2	--	13.6
Marsh without trees	4.4	20.1	18.5	18.3	33.7
Other farm-farmstead	9.0	11.1	9.2	--	4.4
Urban and other	53.2	31.2	13.8	20.3	43.2
Noncensus water	--	3.1	--	--	--
Subtotal	304.0	306.8	267.5	209.2	259.4
Total	331.0	344.2	301.7	244.5	306.0
Total land	578.3	518.5	482.8	401.7	512.5
Water (Bureau of the Census)[1/]	3.0	8.3	6.7	6.4	5.1
Total land and water[1/]	581.3	526.8	489.5	408.1	517.6

[1/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 3.--Area of commercial forest land by ownership class and county, Central Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All counties	County						
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon
National Forest	--	--	--	--	--	--	--	--
Miscellaneous federal	130.6	--	--	--	--	29.4	55.9	--
State	96.6	7.0	4.7	--	2.4	42.1	4.2	7.1
County and municipal	399.3	2.3	22.3	134.1	54.7	87.9	15.0	26.1
Indian	4.6	--	--	--	--	2.2	--	2.4
Forest industry	126.0	33.5	--	2.4	--	20.4	6.6	32.9
Farmer	996.7	37.6	102.0	101.8	33.3	124.1	49.4	163.1
Misc. private-corporation	129.5	14.4	17.5	4.9	2.4	4.6	21.6	14.0
Misc. private-individual	1,067.6	139.5	79.2	72.9	61.7	60.7	99.4	112.9
All owners	2,950.9	234.3	225.7	316.1	154.5	371.4	252.1	358.5

(Table 3 continued)

(Table 3 continued)

Ownership class	County					
	Marquette	Monroe	Portage	Waupaca	Waushara	Wood
National Forest	--	--	--	--	--	--
Miscellaneous federal	--	45.3	--	--	--	--
State	--	--	11.0	--	11.3	6.8
County and municipal	--	9.1	--	--	--	47.8
Indian	--	--	--	--	--	--
Forest industry	--	--	4.4	9.8	2.3	13.7
Farmer	44.8	109.2	54.1	87.4	49.1	40.8
Misc. private-corporation	--	11.4	2.2	4.9	15.8	15.8
Misc. private-individual	49.5	70.0	102.6	70.5	67.1	81.6
All owners	94.3	245.0	174.3	172.6	145.6	206.5

Table 4.--Area of commercial forest land by ownership class and site class, Central Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
National Forest	--	--	--	--	--	--	--
Miscellaneous federal	130.6	--	--	--	13.1	59.6	57.9
State	96.6	--	--	6.6	6.6	51.6	31.8
County and municipal	399.3	--	--	9.2	63.9	229.2	97.0
Indian	4.6	--	--	--	--	4.6	--
Forest industry	126.0	--	--	5.2	25.9	60.2	34.7
Farmer	996.7	--	--	27.4	241.5	411.3	316.5
Misc. private-corporation	129.5	--	2.2	4.7	23.4	62.7	36.5
Misc. private-individual	1,067.6	--	2.2	45.9	190.3	493.0	336.2
All owners	2,950.9	--	4.4	99.0	564.7	1,372.2	910.6

Table 5.--Area of commercial forest land by ownership class and stand-volume class, Central Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Stand-volume class (board feet[1/])		
		Less than 1,500	1,500 to 5,000	5,000+
National Forest	--	--	--	--
Miscellaneous federal	130.6	80.2	37.4	13.0
State	96.6	60.0	27.6	9.0
County and municipal	399.3	257.6	120.2	21.5
Indian	4.6	--	2.4	2.2
Forest industry	126.0	57.9	42.1	26.0
Farmer	996.7	444.7	375.9	176.1
Misc. private-corporation	129.5	64.5	53.1	11.9
Misc. private-individual	1,067.6	513.4	406.2	148.0
All owners	2,950.9	1,478.3	1,064.9	407.7

[1/] International 1/4-inch rule.

Table 6.--Area of privately owned commercial forest land by ownership class, owner tenure, and size of holding, Central Unit, Wisconsin, 1983

(In thousand acres)

Ownership class and owner-tenure class	All sizes	Size of holding (acres)								
		1-4	5-10	11-20	21-50	51-100	101-500	501-2,500	2,501-5,000	5001+
Forest industry										
1-4 years	4.7	--	--	--	--	--	--	--	--	4.7
5-9 years	11.7	--	--	--	--	--	--	2.3	--	9.4
10-19 years	18.4	--	--	--	--	--	--	2.3	--	16.1
20+ years	91.2	--	--	--	--	2.3	2.3	--	--	86.6
All classes	126.0	--	--	--	--	2.3	2.3	4.6	--	116.8
Farmer										
1-4 years	189.2	--	--	18.8	39.1	62.1	62.4	6.8	--	--
5-9 years	156.0	4.9	6.9	21.6	40.3	38.8	43.5	--	--	--
10-19 years	323.7	4.3	16.0	28.0	73.8	109.0	92.6	--	--	--
20+ years	327.8	2.3	7.1	38.7	83.1	83.3	104.1	9.2	--	--
All classes	996.7	11.5	30.0	107.1	236.3	293.2	302.6	16.0	--	--
Misc. priv.-corporation										
1-4 years	25.4	--	--	--	11.6	4.7	4.3	4.8	--	--
5-9 years	21.0	--	--	--	4.5	2.3	6.9	2.5	2.4	2.4
10-19 years	27.5	--	2.3	--	2.2	4.4	4.8	9.1	--	4.7
20+ years	55.6	--	--	--	2.5	--	18.9	9.1	7.2	17.9
All classes	129.5	--	2.3	--	20.8	11.4	34.9	25.5	9.6	25.0
Misc. priv.-individual										
1-4 years	250.1	11.5	20.9	22.9	83.3	65.2	46.3	--	--	--
5-9 years	279.3	4.6	13.6	36.1	86.9	65.9	65.3	6.9	--	--
10-19 years	331.8	6.7	9.2	21.1	101.3	103.4	76.2	13.9	--	--
20+ years	206.4	2.4	2.4	19.9	71.2	55.1	50.1	2.4	--	2.9
All classes	1,067.6	25.2	46.1	100.0	342.7	289.6	237.9	23.2	--	2.9
All private owners										
1-4 years	469.4	11.5	20.9	41.7	134.0	132.0	113.0	11.6	--	4.7
5-9 years	468.0	9.5	20.5	57.7	131.7	107.0	115.7	11.7	2.4	11.8
10-19 years	701.4	11.0	27.5	49.1	177.3	216.8	173.6	25.3	--	20.8
20+ years	681.0	4.7	9.5	58.6	156.8	140.7	175.4	20.7	7.2	107.4
All classes	2,319.8	36.7	78.4	207.1	599.8	596.5	577.7	69.3	9.6	144.7

Table 7.--Area of commercial forest land by forest type, stand-size class, and ownership class, Central Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Jack pine										
Sawtimber	24.5	--	4.3	--	--	2.2	--	6.8	--	11.2
Poletimber	97.1	--	8.9	6.9	11.5	--	6.9	9.4	6.5	47.0
Sapling & seedling	81.5	--	11.4	8.9	9.1	--	13.9	4.4	6.8	27.0
All stands	203.1	--	24.6	15.8	20.6	2.2	20.8	20.6	13.3	85.2
Red pine										
Sawtimber	20.9	--	2.1	2.2	2.4	--	--	4.5	2.3	7.4
Poletimber	77.1	--	--	2.2	9.3	--	4.7	15.4	7.1	38.4
Sapling & seedling	37.5	--	6.9	--	2.1	--	14.3	--	--	14.2
All stands	135.5	--	9.0	4.4	13.8	--	19.0	19.9	9.4	60.0
White pine										
Sawtimber	59.8	--	2.2	2.3	4.6	--	4.6	23.1	4.6	18.4
Poletimber	11.3	--	2.2	--	--	--	--	--	--	9.1
Sapling & seedling	6.8	--	-	2.2	2.2	--	--	2.4	--	--
All stands	77.9	--	4.4	4.5	6.8	--	4.6	25.5	4.6	27.5
Balsam fir										
Sawtimber	2.3	--	--	--	--	--	--	--	2.3	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	9.6	--	--	--	--	--	--	7.2	--	2.4
All stands	11.9	--	--	--	--	--	--	7.2	2.3	2.4
White spruce										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.2	--	--	--	--	--	--	--	--	2.2
All stands	2.2	--	--	--	--	--	--	--	--	2.2
Black spruce										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	11.6	--	2.2	2.3	4.7	--	--	2.4	--	--
All stands	11.6	--	2.2	2.3	4.7	--	--	2.4	--	--
Northern white-cedar										
Sawtimber	2.4	--	--	2.4	--	--	--	--	--	--
Poletimber	18.7	--	--	--	--	--	--	9.5	2.3	6.9
Sapling & seedling	2.2	--	--	--	--	--	--	--	--	2.2
All stands	23.3	--	--	2.4	--	--	--	9.5	2.3	9.1

(Table 7 continued on next page)

(Table 7 continued)

Forest type and stand-size class	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Tamarack										
Sawtimber	2.2	--	--	--	--	--	--	2.2	--	--
Poletimber	16.4	--	--	--	2.5	--	--	7.0	--	6.9
Sapling & seedling	20.4	--	--	4.4	--	--	--	11.4	2.2	2.4
All stands	39.0	--	--	4.4	2.5	--	--	20.6	2.2	9.3
Oak-hickory										
Sawtimber	375.2	--	8.8	7.0	13.9	--	4.8	184.2	12.0	144.5
Poletimber	384.7	--	22.4	6.5	65.6	--	7.2	110.6	20.3	152.1
Sapling & seedling	177.7	--	15.4	--	25.1	--	9.0	39.1	11.3	77.8
All stands	937.6	--	46.6	13.5	104.6	--	21.0	333.9	43.6	374.4
Elm-ash-soft maple										
Sawtimber	93.9	--	2.3	2.4	2.4	--	4.8	42.4	2.4	37.2
Poletimber	95.5	--	2.3	2.3	6.9	--	2.4	39.9	2.3	39.4
Sapling & seedling	82.1	--	--	4.5	4.8	--	2.3	30.5	11.6	28.4
All stands	271.5	--	4.6	9.2	14.1	--	9.5	112.8	16.3	105.0
Maple-birch										
Sawtimber	224.9	--	2.1	4.5	9.6	--	23.4	108.0	11.8	65.5
Poletimber	130.6	--	--	4.4	11.9	--	4.7	43.2	7.3	59.1
Sapling & seedling	150.7	--	2.2	13.5	18.9	--	--	74.0	--	42.1
All stands	506.2	--	4.3	22.4	40.4	--	28.1	225.2	19.1	166.7
Aspen										
Sawtimber	64.8	--	6.4	2.3	7.2	--	--	25.2	--	23.7
Poletimber	268.9	--	13.1	6.7	85.7	2.4	13.7	66.1	4.9	76.3
Sapling & seedling	243.8	--	10.8	8.7	73.0	--	9.3	60.5	9.1	72.4
All stands	577.5	--	30.3	17.7	165.9	2.4	23.0	151.8	14.0	172.4
Paper birch										
Sawtimber	11.6	--	--	--	2.5	--	--	6.8	--	2.3
Poletimber	51.8	--	--	--	12.0	--	--	21.1	--	18.7
Sapling & seedling	55.2	--	2.3	--	11.4	--	--	32.4	2.4	6.7
All stands	118.6	--	2.3	--	25.9	--	--	60.3	2.4	27.7
Exotic										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.2	--	--	--	--	--	--	--	--	2.2
All stands	2.2	--	--	--	--	--	--	--	--	2.2
Nonstocked	32.8	--	2.3	--	--	--	--	7.0	--	23.5
All types										
Sawtimber	882.5	--	28.2	23.1	42.6	2.2	37.6	403.2	35.4	310.2
Poletimber	1,152.1	--	48.9	29.0	205.4	2.4	39.6	322.2	50.7	453.9
Sapling & seedling	883.5	--	51.2	44.5	151.3	--	48.8	264.3	43.4	280.0
Nonstocked	32.8	--	2.3	--	--	--	--	7.0	--	23.5
All stands	2,950.9	--	130.6	96.6	399.3	4.6	126.0	996.7	129.5	1,067.6

Table 8.--Area of commercial forest land by forest type and county, Central Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All counties	County												
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette	Monroe	Portage	Waupaca	Waushara	Wood
Jack pine	203.1	40.3	--	4.8	7.2	62.8	45.2	--	--	22.7	4.4	--	4.4	11.3
Red pine	135.5	33.8	--	4.9	7.1	15.8	12.8	2.4	6.8	2.3	17.4	9.8	17.9	4.5
White pine	77.9	4.7	5.0	4.9	4.7	15.7	4.3	4.7	4.4	4.4	2.2	4.8	9.0	9.1
Balsam fir	11.9	--	--	--	--	--	--	4.7	--	--	--	7.2	--	--
White spruce	2.2	--	--	--	--	--	--	--	--	--	--	--	--	2.2
Black spruce	11.6	--	2.4	--	--	2.3	2.2	2.4	--	--	--	--	--	2.3
Northern white-cedar	23.3	--	--	--	--	--	--	9.4	--	--	4.4	7.3	2.2	--
Tamarack	39.0	--	7.3	--	--	13.5	--	2.3	2.3	--	2.1	4.8	4.5	2.2
Oak-hickory	937.6	103.7	34.5	61.1	78.6	148.4	103.5	16.3	56.0	142.8	48.0	29.2	72.1	43.4
Elm-ash-soft maple	271.5	2.4	36.9	19.4	7.1	13.7	15.2	51.9	8.9	9.1	22.0	48.9	13.3	22.7
Maple-birch	506.2	14.3	72.8	65.5	11.9	24.4	17.3	156.3	4.6	31.9	32.2	45.8	8.7	20.5
Aspen	577.5	25.5	42.1	134.1	33.1	61.0	49.5	87.2	4.6	11.4	35.1	12.3	6.9	74.7
Paper birch	118.6	4.8	17.2	19.0	4.8	13.8	2.1	14.0	4.5	15.8	4.3	2.5	2.2	13.6
Exotic	2.2	--	--	--	--	--	--	--	--	--	--	--	2.2	--
Nonstocked	32.8	4.8	7.5	2.4	--	--	--	6.9	2.2	4.6	2.2	--	2.2	--
All types	2,950.9	234.3	225.7	316.1	154.5	371.4	252.1	358.5	94.3	245.0	174.3	172.6	145.6	206.5

Table 9.--Area of commercial forest land by county and stand-size class, Central Unit, Wisconsin, 1983

(In thousand acres)

County	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Adams	234.3	47.2	82.1	100.2	4.8
Chippewa	225.7	66.0	84.1	68.1	7.5
Clark	316.1	71.1	129.1	113.5	2.4
Eau Claire	154.5	35.7	90.5	28.3	--
Jackson	371.4	92.3	155.8	123.3	--
Juneau	252.1	81.8	105.7	64.6	--
Marathon	358.5	114.5	143.5	93.6	6.9
Marquette	94.3	38.1	22.6	31.4	2.2
Monroe	245.0	99.5	88.8	52.1	4.6
Portage	174.3	50.3	65.6	56.2	2.2
Waupaca	172.6	95.6	51.3	25.7	--
Wausahra	145.6	38.1	64.8	40.5	2.2
Wood	206.5	52.3	68.2	86.0	--
All counties	2,950.9	882.5	1,152.1	883.5	32.8

Table 10.--Area of commercial forest land by forest type, stand-size class, and site class, Central Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Jack pine							
Sawtimber	24.5	--	--	--	--	13.3	11.2
Poletimber	97.1	--	--	--	7.1	63.2	26.8
Sapling & seedling	81.5	--	--	--	4.5	33.8	43.2
All stands	203.1	--	--	--	11.6	110.3	81.2
Red pine							
Sawtimber	20.9	--	--	6.9	4.6	7.2	2.2
Poletimber	77.1	--	4.4	31.7	38.8	2.2	--
Sapling & seedling	37.5	--	--	7.5	11.0	12.1	6.9
All stands	135.5	--	4.4	46.1	54.4	21.5	9.1
White pine							
Sawtimber	59.8	--	--	6.7	27.3	9.5	16.3
Poletimber	11.3	--	--	2.2	4.5	4.6	--
Sapling & seedling	6.8	--	--	--	4.6	2.2	--
All stands	77.9	--	--	8.9	36.4	16.3	16.3
Balsam fir							
Sawtimber	2.3	--	--	--	2.3	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	9.6	--	--	2.4	4.8	2.4	--
All stands	11.9	--	--	2.4	7.1	2.4	--
White spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	2.2	--	--	--	--	--	2.2
All stands	2.2	--	--	--	--	--	2.2
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	11.6	--	--	--	--	4.6	7.0
All stands	11.6	--	--	--	--	4.6	7.0
Northern white-cedar							
Sawtimber	2.4	--	--	--	--	--	2.4
Poletimber	18.7	--	--	--	--	2.4	16.3
Sapling & seedling	2.2	--	--	--	--	--	2.2
All stands	23.3	--	--	--	--	2.4	20.9

(Table 10 continued on next page)

(Table 10 continued)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Tamarack							
Sawtimber	2.2	--	--	--	--	--	2.2
Poletimber	16.4	--	--	--	2.4	9.5	4.5
Sapling & seedling	20.4	--	--	--	2.4	9.0	9.0
All stands	39.0	--	--	--	4.8	18.5	15.7
Oak-hickory							
Sawtimber	375.2	--	--	4.4	83.3	176.2	111.3
Poletimber	384.7	--	--	--	30.1	216.1	138.5
Sapling & seedling	177.7	--	--	--	20.9	86.4	70.4
All stands	937.6	--	--	4.4	134.3	478.7	320.2
Elm-ash-soft maple							
Sawtimber	93.9	--	--	--	9.3	38.0	46.6
Poletimber	95.5	--	--	--	11.7	25.4	58.4
Sapling & seedling	82.1	--	--	--	4.7	33.2	44.2
All stands	271.5	--	--	--	25.7	96.6	149.2
Maple-birch							
Sawtimber	224.9	--	--	2.3	35.8	109.1	77.7
Poletimber	130.6	--	--	4.6	26.1	64.8	35.1
Sapling & seedling	150.7	--	--	4.7	30.6	78.5	36.9
All stands	506.2	--	--	11.6	92.5	252.4	149.7
Aspen							
Sawtimber	64.8	--	--	9.0	25.8	21.1	8.9
Poletimber	268.9	--	--	9.4	82.1	156.5	20.9
Sapling & seedling	243.8	--	--	4.9	67.0	127.3	44.6
All stands	577.5	--	--	23.3	174.9	304.9	74.4
Paper birch							
Sawtimber	11.6	--	--	2.3	6.9	--	2.4
Poletimber	51.8	--	--	--	4.6	31.1	16.1
Sapling & seedling	55.2	--	--	--	9.3	18.4	27.5
All stands	118.6	--	--	2.3	20.8	49.5	46.0
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	2.2	--	--	--	2.2	--	--
All stands	2.2	--	--	--	2.2	--	--
Nonstocked	32.8	--	--	--	--	14.1	18.7
All types							
Sawtimber	882.5	--	--	31.6	195.3	374.4	281.2
Poletimber	1,152.1	--	4.4	47.9	207.4	575.8	316.6
Sapling & seedling	883.5	--	--	19.5	162.0	407.9	294.1
Nonstocked	32.8	--	--	--	--	14.1	18.7
All stands	2,950.9	--	4.4	99.0	564.7	1,372.2	910.6

Table 11.--Area of commercial forest land by forest type and stand-age class, Central Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	203.1	11.2	61.7	28.9	38.3	43.2	13.4	4.2	2.2	--	--	--	--	--
Red pine	135.5	19.4	29.4	54.4	15.9	4.5	9.7	--	--	--	2.2	--	--	--
White pine	77.9	2.2	6.8	--	11.6	8.9	4.6	11.6	4.5	13.8	2.3	4.6	2.3	4.7
Balsam fir	11.9	4.8	2.4	2.4	--	2.3	--	--	--	--	--	--	--	--
White spruce	2.2	--	2.2	--	--	--	--	--	--	--	--	--	--	--
Black spruce	11.6	2.4	6.8	--	--	2.4	--	--	--	--	--	--	--	--
Northern white-cedar	23.3	--	--	--	--	--	11.5	2.5	4.7	2.2	2.4	--	--	--
Tamarack	39.0	6.9	13.5	--	2.5	2.4	4.7	2.4	4.5	2.1	--	--	--	--
Oak-hickory	937.6	97.8	54.4	43.6	57.5	138.9	163.0	119.3	110.7	47.5	39.3	34.1	22.6	8.9
Elm-ash-soft maple	271.5	49.2	30.6	2.3	25.4	37.9	23.4	20.8	35.2	21.5	13.8	9.0	2.4	--
Maple-birch	506.2	67.3	62.2	30.9	28.3	45.4	54.4	61.1	39.2	50.9	26.5	20.9	12.0	7.1
Aspen	577.5	132.6	76.5	51.1	85.9	138.0	54.0	4.5	22.8	9.8	2.3	--	--	--
Paper birch	118.6	25.0	21.1	11.5	25.9	11.6	11.9	9.3	2.3	--	--	--	--	--
Exotic	2.2	--	2.2	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	32.8	32.8	--	--	--	--	--	--	--	--	--	--	--	--
All types	2,950.9	451.6	369.8	225.1	291.3	435.5	350.6	235.7	226.1	147.8	88.8	68.6	39.3	20.7

Table 12.--Area of commercial forest land by forest type and site-index class, Central Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All classes	Site-index class (feet)								
		11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
Jack pine	203.1	--	--	4.7	24.6	63.1	72.6	35.7	2.4	--
Red pine	135.5	--	--	6.8	2.2	19.3	35.9	46.3	20.6	4.4
White pine	77.9	--	--	2.3	11.7	16.4	27.2	13.6	6.7	--
Balsam fir	11.9	--	--	--	7.1	2.4	2.4	--	--	--
White spruce	2.2	--	--	--	2.2	--	--	--	--	--
Black spruce	11.6	--	--	2.4	4.6	4.6	--	--	--	--
Northern white-cedar	23.3	--	6.9	9.4	4.6	--	2.4	--	--	--
Tamarack	39.0	--	--	4.5	11.2	11.6	6.9	2.4	2.4	--
Oak-hickory	937.6	--	--	54.6	131.8	277.5	267.5	123.7	71.3	11.2
Elm-ash-soft maple	271.5	--	--	2.2	23.2	78.8	94.3	47.3	25.7	--
Maple-birch	506.2	--	--	4.8	26.7	118.2	176.1	106.3	60.2	13.9
Aspen	577.5	--	--	--	35.2	122.8	188.2	147.2	60.8	23.3
Paper birch	118.6	--	--	2.3	13.7	25.3	28.7	25.5	20.8	2.3
Exotic	2.2	--	--	--	--	--	--	2.2	--	--
Nonstocked	32.8	--	--	4.5	2.3	11.9	9.2	4.9	--	--
All types	2,950.9	--	6.9	98.5	301.1	751.9	911.4	555.1	270.9	55.1

Table 13.--Area of commercial forest land by forest type, stand-size class, and basal-area class, Central Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	24.5	--	--	--	2.2	--	4.4	2.4	2.3	4.2	2.2	4.6	2.2	--	--
Poletimber	97.1	--	--	--	2.3	4.6	11.1	11.2	15.8	26.8	11.6	9.2	2.3	--	2.2
Sapling & seedling	81.5	8.9	6.8	11.8	2.3	8.9	8.9	13.4	20.5	--	--	--	--	--	--
All stands	203.1	8.9	6.8	11.8	6.8	13.5	24.4	27.0	38.6	31.0	13.8	13.8	4.5	--	2.2
Red pine															
Sawtimber	20.9	--	--	--	--	--	--	--	2.3	4.9	2.4	4.4	4.4	2.5	--
Poletimber	77.1	--	--	--	--	--	4.4	2.4	2.2	4.4	2.4	15.6	16.1	9.0	20.6
Sapling & seedling	37.5	16.5	4.6	--	2.3	2.9	2.3	--	2.1	4.5	--	2.3	--	--	--
All stands	135.5	16.5	4.6	--	2.3	2.9	6.7	2.4	6.6	13.8	4.8	22.3	20.5	11.5	20.6
White pine															
Sawtimber	59.8	--	2.5	--	--	--	2.3	--	7.2	6.8	4.6	18.1	16.0	2.3	--
Poletimber	11.3	--	--	--	--	--	2.2	--	--	2.2	--	2.3	--	4.6	--
Sapling & seedling	6.8	--	--	--	--	2.2	2.4	--	2.2	--	--	--	--	--	--
All stands	77.9	--	2.5	--	--	2.2	6.9	--	9.4	9.0	4.6	20.4	16.0	6.9	--
Balsam fir															
Sawtimber	2.3	--	--	--	--	2.3	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	9.6	--	--	2.4	--	2.4	--	2.4	2.4	--	--	--	--	--	--
All stands	11.9	--	--	2.4	--	4.7	--	2.4	2.4	--	--	--	--	--	--
White spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.2	--	--	--	--	--	--	--	2.2	--	--	--	--	--	--
All stands	2.2	--	--	--	--	--	--	--	2.2	--	--	--	--	--	--
Black spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	11.6	2.4	2.3	--	--	2.3	2.2	--	--	--	--	2.4	--	--	--
All stands	11.6	2.4	2.3	--	--	2.3	2.2	--	--	--	--	2.4	--	--	--
Northern white-cedar															
Sawtimber	2.4	--	--	--	--	--	--	--	2.4	--	--	--	--	--	--
Poletimber	18.7	--	--	--	--	--	--	--	--	--	--	2.2	2.2	4.7	9.6
Sapling & seedling	2.2	--	--	--	--	--	--	--	--	--	--	2.2	--	--	--
All stands	23.3	--	--	--	--	--	--	--	2.4	--	--	4.4	2.2	4.7	9.6

(Table 13 continued on next page)

(Table 13 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	2.2	--	--	2.2	--	--	--	--	--	--	--	--	--	--	--
Poletimber	16.4	--	--	--	2.4	2.5	--	--	--	6.8	4.7	--	--	--	--
Sapling & seedling	20.4	8.9	2.3	--	--	6.9	--	2.3	--	--	--	--	--	--	--
All stands	39.0	8.9	2.3	2.2	2.4	9.4	--	2.3	--	6.8	4.7	--	--	--	--
Oak-hickory															
Sawtimber	375.2	--	--	4.5	2.2	22.4	30.0	27.5	38.9	45.4	27.3	91.9	73.7	6.8	4.6
Poletimber	384.7	--	--	--	4.5	2.2	55.8	20.3	52.8	59.5	45.8	51.9	71.4	18.2	2.3
Sapling & seedling	177.7	11.2	13.7	50.4	15.8	27.2	27.3	16.1	8.9	4.6	2.5	--	--	--	--
All stands	937.6	11.2	13.7	54.9	22.5	51.8	113.1	63.9	100.6	109.5	75.6	143.8	145.1	25.0	6.9
Elm-ash-soft maple															
Sawtimber	93.9	--	2.4	2.4	--	8.9	2.5	4.4	9.5	9.5	14.5	14.0	18.6	7.2	--
Poletimber	95.5	--	2.4	2.4	6.8	9.1	11.4	9.7	11.5	13.9	2.3	14.3	4.6	4.6	2.5
Sapling & seedling	82.1	15.8	14.4	2.4	11.9	4.7	19.0	4.8	7.0	--	--	2.1	--	--	--
All stands	271.5	15.8	19.2	7.2	18.7	22.7	32.9	18.9	28.0	23.4	16.8	30.4	23.2	11.8	2.5
Maple-birch															
Sawtimber	224.9	--	--	3.9	--	16.5	13.5	2.4	26.2	36.9	18.6	33.1	52.5	16.7	4.6
Poletimber	130.6	--	--	2.4	4.9	2.3	11.6	12.0	16.9	9.5	16.7	23.5	23.7	2.5	4.6
Sapling & seedling	150.7	16.7	17.5	20.8	16.4	18.2	18.7	6.8	7.0	11.8	4.8	9.8	2.2	--	--
All stands	506.2	16.7	17.5	27.1	21.3	37.0	43.8	21.2	50.1	58.2	40.1	66.4	78.4	19.2	9.2
Aspen															
Sawtimber	64.8	--	2.3	--	2.3	4.4	4.6	2.2	6.8	8.9	7.2	16.3	4.8	5.0	--
Poletimber	268.9	--	2.4	2.2	4.7	14.1	23.1	20.9	34.9	46.7	16.1	59.0	32.7	9.7	2.4
Sapling & seedling	243.8	33.8	48.9	37.2	29.9	37.9	18.7	21.0	7.0	7.0	--	2.4	--	--	--
All stands	577.5	33.8	53.6	39.4	36.9	56.4	46.4	44.1	48.7	62.6	23.3	77.7	37.5	14.7	2.4
Paper birch															
Sawtimber	11.6	--	--	--	--	--	--	4.8	2.3	2.1	--	--	2.4	--	--
Poletimber	51.8	--	--	--	--	4.7	4.6	2.5	14.2	4.7	4.7	2.1	11.8	2.5	--
Sapling & seedling	55.2	4.6	16.0	9.3	6.8	6.9	6.9	--	--	2.4	--	2.3	--	--	--
All stands	118.6	4.6	16.0	9.3	6.8	11.6	11.5	7.3	16.5	9.2	4.7	4.4	14.2	2.5	--
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.2	--	--	--	--	--	--	--	2.2	--	--	--	--	--	--
All stands	2.2	--	--	--	--	--	--	--	2.2	--	--	--	-	--	--
Nonstocked	32.8	9.0	11.8	--	2.5	--	--	--	--	--	7.1	--	2.4	--	--
All types															
Sawtimber	882.5	--	7.2	13.0	6.7	54.5	57.3	43.7	97.9	118.7	76.8	182.4	174.6	40.5	9.2
Poletimber	1,152.1	--	4.8	7.0	25.6	39.5	124.2	79.0	148.3	174.5	104.3	180.1	164.8	55.8	44.2
Sapling & seedling	883.5	118.8	126.5	134.3	85.4	120.5	106.4	66.8	61.5	30.3	7.3	23.5	2.2	--	--
Nonstocked	32.8	9.0	11.8	--	2.5	--	--	--	--	--	7.1	--	2.4	--	--
All stands	2,950.9	127.8	150.3	154.3	120.2	214.5	287.9	189.5	307.7	323.5	195.5	386.0	344.0	96.3	53.4

Table 14.--Area of commercial forest land by stocking class of growing-stock trees and stand-size class, Central Unit, Wisconsin, 1983

(In thousand acres)

Stocking class (percent)	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Less than 16.7	32.8	--	--	--	32.8
16.7 to 60.9	647.1	246.2	227.6	173.3	--
61.0 to 100.9	1,236.3	354.1	543.1	339.1	--
101.0 to 133.9	874.7	259.2	323.4	292.1	--
134.0+	160.0	23.0	58.0	79.0	--
All classes	2,950.9	882.5	1,152.1	883.5	32.8

Table 15.--Area of commercial forest land in planations by forest type and stand-age class, Central Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	35.8	--	7.1	--	2.3	9.0	11.0	4.2	2.2	--	--	--	--	--
Red pine	114.9	19.4	27.0	50.0	11.5	4.5	2.5	--	--	--	--	--	--	--
White pine	22.5	2.2	4.4	--	4.6	6.8	2.2	2.3	--	--	--	--	--	--
White spruce	2.2	--	2.2	--	--	--	--	--	--	--	--	--	--	--
Exotic	2.2	--	2.2	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	2.3	2.3	--	--	--	--	--	--	--	--	--	--	--	--
All types	179.9	23.9	42.9	50.0	18.4	20.3	15.7	6.5	2.2	--	--	--	--	--

Table 16.--Area of commercial forest land with conifer understory by forest type and conifer understory species, Central Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All species	Conifer understory species									
		White pine	Red pine	Jack pine	Balsam fir	White spruce	Black spruce	Hemlock	Northern white-cedar	Eastern redcedar	Other softwoods
Jack pine	119.9	6.8	2.4	108.5	--	--	--	--	--	--	2.2
Red pine	31.6	4.4	22.8	4.4	--	--	--	--	--	--	--
White pine	50.5	48.1	--	--	2.4	--	--	--	--	--	--
Balsam fir	9.6	--	--	--	9.6	--	--	--	--	--	--
Black spruce	11.6	--	--	--	--	--	9.3	--	--	--	2.3
Northern white-cedar	11.5	--	--	--	2.3	--	--	--	9.2	--	--
Tamarack	36.9	--	--	--	--	--	2.3	--	--	--	34.6
Oak-hickory	231.9	103.2	8.8	103.9	7.0	2.2	--	--	--	2.2	4.6
Elm-ash-soft maple	51.0	20.6	--	--	25.7	--	--	4.7	--	--	--
Maple-birch	99.6	47.7	2.2	6.7	31.2	--	--	7.1	2.5	--	2.2
Aspen	90.5	46.7	7.1	15.7	16.5	--	2.2	2.3	--	--	--
Paper birch	18.2	9.1	2.3	--	2.4	--	--	--	2.1	--	2.3
Exotic	2.2	--	--	--	--	2.2	--	--	--	--	--
Nonstocked	4.6	--	4.6	--	--	--	--	--	--	--	--
All types	769.6	286.6	50.2	239.2	97.1	4.4	13.8	14.1	13.8	2.2	48.2

Table 17.--Area of noncommercial forest land by ownership class, Central Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All areas	Unproductive areas	Productive-reserved areas
National Forest	--	--	--
Miscellaneous federal	2.3	2.3	--
State	8.0	--	8.0
County and municipal	3.9	--	3.9
Indian	--	--	--
Forest industry	--	--	--
Farmer	9.4	7.1	2.3
Misc. private-corp.	4.4	--	4.4
Misc. private-indiv.	23.6	12.1	11.5
Total	51.6	21.5	30.1

Table 18.--Area of noncommercial forest land by forest type, Central Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All areas	Unproductive areas	Productive-reserved areas
Jack pine	--	--	--
Red pine	11.3	--	11.3
White pine	--	--	--
Balsam fir	--	--	--
White spruce	--	--	--
Black spruce	2.4	2.4	--
Northern white-cedar	--	--	--
Tamarack	--	--	--
Oak-hickory	4.8	2.3	2.5
Elm-ash-soft maple	12.8	7.3	5.5
Maple-birch	2.5	2.5	--
Aspen	6.3	2.3	4.0
Paper birch	2.3	2.3	--
Exotic	6.8	--	6.8
Nonstocked	2.4	2.4	--
All types	51.6	21.5	30.1

Table 19.--Number of all live trees on commercial forest land by species group and diameter class, Central Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0 38.9	39.0+
Softwoods															
Jack pine	142,690	74,982	27,427	19,928	12,384	5,508	1,971	394	96	--	--	--	--	--	--
Red pine	77,746	14,937	18,138	27,681	13,041	2,479	665	415	234	120	26	10	--	--	--
White pine	54,563	26,632	10,246	7,515	3,842	2,320	1,272	915	730	419	316	192	118	46	--
White spruce	5,272	2,082	2,972	175	--	22	13	8	--	--	--	--	--	--	--
Black spruce	11,214	6,403	3,305	1,388	64	40	14	--	--	--	--	--	--	--	--
Balsam fir	27,614	15,992	7,160	2,902	1,143	314	95	--	--	8	--	--	--	--	--
Hemlock	6,153	1,376	718	1,465	1,016	725	427	198	113	60	34	4	17	--	--
Tamarack	30,273	19,751	5,024	3,485	1,520	258	142	75	13	5	--	--	--	--	--
Eastern redcedar	1,279	1,138	--	32	56	44	9	--	--	--	--	--	--	--	--
Northern white-cedar	24,393	6,736	9,609	4,631	2,407	639	304	48	15	--	4	--	--	--	--
Other softwoods	5,255	2,892	1,362	697	175	69	49	--	11	--	--	--	--	--	--
Total	386,452	172,921	85,961	69,899	35,648	12,418	4,961	2,053	1,212	612	380	206	135	46	--
Hardwoods															
White oak	87,681	41,875	16,918	10,953	6,857	4,517	2,822	1,611	1,071	600	201	132	99	22	3
Select red oak	66,005	29,246	5,806	6,804	7,279	6,238	4,445	2,398	1,579	960	547	334	313	56	--
Other red oak	199,582	108,422	25,238	22,818	17,361	12,140	6,593	3,303	1,942	860	435	244	216	10	--
Select hickory	5,257	3,395	1,102	179	168	248	44	69	41	5	--	6	--	--	--
Other hickory	8,209	4,342	2,098	634	646	228	194	54	13	--	--	--	--	--	--
Basswood	21,407	9,808	4,218	1,325	1,996	2,010	917	509	319	162	66	41	28	8	--
Beech	92	--	--	--	31	--	30	10	7	6	8	--	--	--	--
Yellow birch	17,707	9,293	3,592	1,479	1,435	888	587	265	98	34	21	14	--	1	--
Hard maple	50,351	25,188	10,776	5,736	3,202	1,868	1,357	930	622	335	150	105	73	9	--
Soft maple	280,420	171,918	56,732	27,162	12,144	6,076	3,030	1,522	925	390	175	168	148	24	6
Elm	46,480	29,655	8,429	4,469	1,249	1,237	664	455	201	64	13	27	10	7	--
Black ash	38,496	18,238	9,553	5,666	2,510	1,457	652	277	103	26	14	--	--	--	--
White & green ash	22,689	14,145	3,097	2,279	1,006	1,207	494	219	120	68	31	16	7	--	--
Cottonwood	79	--	--	--	27	--	11	8	--	5	12	--	8	8	--
Willow	1,372	1,220	--	--	25	52	22	17	7	9	8	4	6	2	--
Hackberry	219	219	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	52,551	25,847	7,784	6,329	5,677	3,961	1,844	731	280	70	12	10	6	--	--
Quaking aspen	248,985	151,231	37,762	26,259	19,487	9,599	3,210	1,028	313	71	19	6	--	--	--
Paper birch	121,357	64,251	28,780	17,041	7,550	2,837	670	203	25	--	--	--	--	--	--
River birch	1,698	1,055	211	--	208	147	66	--	--	--	8	--	3	--	--
Black cherry	61,314	46,813	9,700	2,473	1,395	735	106	44	29	17	--	--	--	2	--
Black walnut	29	--	--	--	--	--	16	11	--	--	--	--	2	--	--
Butternut	1,599	1,208	--	--	144	--	71	81	40	40	13	--	2	--	--
Other hardwoods	7,569	4,972	1,398	601	171	223	103	73	16	6	6	--	--	--	--
Noncommercial species	93,694	79,992	11,230	1,841	420	185	19	--	7	--	--	--	--	--	--
Total	1,434,842	842,333	244,424	144,048	90,988	55,853	27,967	13,818	7,758	3,728	1,739	1,107	921	149	9
All species	1,821,294	1,015,254	330,385	213,947	126,636	68,271	32,928	15,871	8,970	4,340	2,119	1,313	1,056	195	9

Table 20.--Number of growing-stock trees on commercial forest land by species group and diameter class, Central Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	137,486	74,301	26,549	17,793	11,626	5,102	1,733	323	59	--	--	--	--	--	--
Red pine	76,891	14,937	17,906	27,365	12,794	2,426	665	415	227	120	26	10	--	--	--
White pine	52,592	26,632	10,246	6,768	3,404	1,863	1,120	870	697	379	303	169	105	36	--
White spruce	5,272	2,082	2,972	175	--	22	13	8	--	--	--	--	--	--	--
Black spruce	11,214	6,403	3,305	1,388	64	40	14	--	--	--	--	--	--	--	--
Balsam fir	27,470	15,992	7,160	2,902	1,055	286	75	--	--	--	--	--	--	--	--
Hemlock	5,814	1,376	718	1,419	967	640	328	180	100	43	24	4	15	--	--
Tamarack	30,049	19,751	5,024	3,316	1,486	258	142	54	13	5	--	--	--	--	--
Eastern redcedar	1,229	1,138	--	32	31	28	--	--	--	--	--	--	--	--	--
Northern white-cedar	23,438	6,736	9,377	4,256	2,278	525	238	28	--	--	--	--	--	--	--
Other softwoods	4,773	2,892	1,136	549	118	18	49	--	11	--	--	--	--	--	--
Total	376,228	172,240	84,393	65,963	33,823	11,208	4,377	1,878	1,107	547	353	183	120	36	--
Hardwoods															
White oak	76,612	41,424	13,529	8,458	5,047	3,512	2,014	1,226	747	387	126	82	50	10	--
Select red oak	61,081	29,246	5,570	5,418	6,469	5,612	3,786	1,898	1,331	834	444	231	207	35	--
Other red oak	171,921	107,523	21,978	14,913	11,385	8,021	4,185	1,864	1,141	441	248	116	102	4	--
Select hickory	4,731	3,395	883	37	168	131	24	61	26	--	--	6	--	--	--
Other hickory	8,079	4,342	2,098	634	573	214	172	33	13	--	--	--	--	--	--
Basswood	20,330	9,808	3,974	1,234	1,772	1,772	799	472	262	141	42	29	25	--	--
Beech	78	--	--	--	31	--	30	10	7	--	--	--	--	--	--
Yellow birch	15,630	8,805	3,360	1,279	1,045	510	369	164	76	17	4	--	--	1	--
Hard maple	46,456	24,262	10,082	5,052	2,796	1,606	1,047	694	476	245	102	67	23	4	--
Soft maple	266,862	170,785	51,594	23,909	10,856	5,047	2,258	1,223	661	244	93	90	93	9	--
Elm	43,540	29,436	7,501	3,515	962	925	573	371	159	57	13	19	7	2	--
Black ash	36,123	18,238	8,146	5,124	2,289	1,354	626	248	64	20	14	--	--	--	--
White & green ash	21,764	14,145	3,097	2,009	702	995	450	164	97	61	31	9	4	--	--
Cottonwood	59	--	--	--	27	--	--	8	--	5	8	--	5	6	--
Willow	1,366	1,220	--	--	25	52	22	17	7	9	8	--	4	2	--
Hackberry	219	219	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	51,296	25,392	7,784	6,114	5,472	3,866	1,721	656	237	45	--	3	6	--	--
Quaking aspen	238,614	149,646	34,299	23,812	18,231	8,686	2,843	826	236	30	5	--	--	--	--
Paper birch	113,765	63,322	26,657	14,136	6,637	2,328	526	141	18	--	--	--	--	--	--
River birch	1,504	1,055	211	--	111	84	32	--	--	--	8	--	3	--	--
Black cherry	53,298	44,948	5,771	1,306	635	542	42	36	6	12	--	--	--	--	--
Black walnut	11	--	--	--	--	--	--	11	--	--	--	--	--	--	--
Butternut	1,464	1,208	--	--	113	--	29	49	15	35	13	--	2	--	--
Other hardwoods	5,578	3,800	1,172	232	80	207	66	21	--	--	--	--	--	--	--
Total	1,240,381	752,219	207,706	117,182	75,426	45,464	21,614	10,193	5,579	2,583	1,159	652	531	73	--
All species	1,616,609	924,459	292,099	183,145	109,249	56,672	25,991	12,071	6,686	3,130	1,512	835	651	109	--

Table 21.--Net volume of growing stock on commercial forest land by species group, Central Unit, Wisconsin, 1968 and 1983

(In thousand cubic feet)

Species group	1968[1/]	1983
Softwoods		
Jack pine	137,700	190,546
Red pine	36,900	232,454
White pine	103,700	172,290
White spruce	700	905
Black spruce	1,700	3,982
Balsam fir	10,300	16,335
Hemlock	27,800	26,895
Tamarack	16,500	25,976
Eastern redcedar	250	405
Northern white-cedar	24,700	30,702
Other softwoods	450	2,565
Total	360,700	703,055
Hardwoods		
White oak	111,000	160,013
Select red oak	249,200	336,908
Other red oak	137,600	317,206
Select hickory	2,800	5,344
Other hickory	6,200	11,836
Basswood	53,100	75,883
Beech	500	1,092
Yellow birch	23,700	24,323
Hard maple	78,600	115,891
Soft maple	146,000	306,458
Elm	105,600	43,125
Black ash	40,400	63,807
White and green ash	23,900	38,682
Cottonwood	--	2,368
Willow	2,400	3,034
Hackberry	--	--
Balsam poplar	100	--
Bigtooth aspen	92,200	153,865
Quaking aspen	225,200	351,029
Paper birch	66,000	127,154
River birch	3,400	2,706
Black cherry	7,900	16,345
Black walnut	200	220
Butternut	2,900	4,880
Other hardwoods	700	3,641
Total	1,379,600	2,165,810
All species	1,740,300	2,868,865

[1/] 1968 volumes adjusted for difference in volume equations.

Table 22.--Net volume of all live trees on commercial forest land by species group and diameter class, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	206,233	53,979	64,211	49,984	27,648	7,976	2,435	--	--	--	--	--	--
Red pine	235,256	101,915	76,065	23,483	10,072	9,496	7,144	5,040	1,410	631	--	--	--
White pine	186,684	11,179	16,437	18,794	18,467	21,581	24,601	19,919	19,618	15,452	12,404	8,232	--
White spruce	905	248	--	205	244	208	--	--	--	--	--	--	--
Black spruce	3,982	2,938	346	411	287	--	--	--	--	--	--	--	--
Balsam fir	17,699	6,346	6,012	3,476	1,544	--	--	321	--	--	--	--	--
Hemlock	29,570	2,278	4,001	5,375	5,242	3,967	3,319	2,007	1,642	220	1,519	--	--
Tamarack	26,885	10,859	9,088	2,577	2,213	1,536	408	204	--	--	--	--	--
Eastern redcedar	680	95	179	310	96	--	--	--	--	--	--	--	--
Northern white-cedar	33,756	11,575	12,138	5,034	3,750	833	255	--	171	--	--	--	--
Other softwoods	3,332	1,223	622	503	686	--	298	--	--	--	--	--	--
Total	744,982	202,635	189,099	110,152	70,249	45,597	38,460	27,491	22,841	16,303	13,923	8,232	--
Hardwoods													
White oak	214,146	23,271	29,700	35,032	33,858	28,471	24,972	17,329	7,228	6,106	6,108	1,505	566
Select red oak	391,969	20,854	42,793	60,508	65,450	49,664	45,635	36,158	25,193	17,821	21,969	5,924	--
Other red oak	485,118	48,898	79,876	98,313	83,394	60,216	46,534	26,074	16,259	11,045	13,423	1,086	--
Select hickory	7,595	684	1,168	2,101	638	1,431	1,008	168	--	397	--	--	--
Other hickory	13,033	2,491	3,757	2,193	3,077	1,078	437	--	--	--	--	--	--
Basswood	85,591	3,446	11,497	19,982	14,678	11,747	9,742	6,443	2,831	2,409	2,252	564	--
Beech	1,535	--	197	--	445	214	236	212	231	--	--	--	--
Yellow birch	34,358	2,833	6,082	7,334	8,152	4,999	2,691	1,165	579	301	--	222	--
Hard maple	140,765	16,393	18,044	18,018	20,378	19,356	17,786	12,713	6,875	5,600	4,661	941	--
Soft maple	365,878	87,535	71,839	59,339	45,716	32,115	25,624	13,571	7,003	8,742	10,006	3,014	1,374
Elm	52,781	6,449	5,479	10,193	9,588	9,474	5,445	2,491	560	1,465	895	742	--
Black ash	69,058	21,303	15,633	13,974	9,154	5,179	2,562	695	558	--	--	--	--
White & green ash	45,566	6,953	6,185	11,607	7,502	4,588	3,525	2,472	1,471	773	490	--	--
Cottonwood	3,010	--	98	--	107	190	--	249	588	--	716	1,062	--
Willow	3,453	--	110	411	347	415	200	463	463	205	546	293	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	160,862	18,654	36,076	43,321	31,167	18,208	9,053	2,948	413	469	553	--	--
Quaking aspen	376,660	91,106	118,011	91,779	45,186	19,631	8,219	2,045	511	172	--	--	--
Paper birch	147,747	61,603	45,464	26,698	9,268	4,014	700	--	--	--	--	--	--
River birch	4,304	--	1,202	1,416	1,048	--	--	--	415	--	223	--	--
Black cherry	27,408	9,023	8,013	6,798	1,548	734	670	546	--	--	--	76	--
Black walnut	566	--	--	--	266	220	--	--	--	--	80	--	--
Butternut	6,834	--	1,139	--	1,072	1,552	989	1,289	609	--	184	--	--
Other hardwoods	6,495	1,512	737	1,724	1,039	903	279	152	149	--	--	--	--
Noncommercial species	7,242	3,855	1,788	1,296	170	--	133	--	--	--	--	--	--
Total	2,651,974	426,863	504,888	512,037	393,248	274,399	206,440	127,183	71,936	55,505	62,106	15,429	1,940
All species	3,396,956	629,498	693,987	622,189	463,497	319,996	244,900	154,674	94,777	71,808	76,029	23,661	1,940

Table 23.--Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Live trees			
Growing-stock trees			
Poletimber	1,610,585	376,548	1,234,037
Sawtimber			
Saw log portion	845,831	248,738	597,093
Upper stem portion	412,449	77,769	334,680
Subtotal	1,258,280	326,507	931,773
Total growing stock	2,868,865	703,055	2,165,810
Cull trees			
Rough and rotten cull trees			
Poletimber	225,217	15,186	210,031
Sawtimber	200,443	16,087	184,356
Subtotal	425,660	31,273	394,387
Short-log trees	102,431	10,654	91,777
Total cull	528,091	41,927	486,164
All live trees	3,396,956	744,982	2,651,974
Salvable dead trees			
Growing-stock trees	43,116	7,417	35,699
Cull trees	2,036	253	1,783
All salvable dead trees	45,152	7,670	37,482
All classes	3,442,108	752,652	2,689,456

Table 24.--Net volume of all live trees by individual species, Central Unit, Wisconsin, 1983

Species	All live trees				Saw log size trees	
	Total all live	Growing stock	Short-log cull	Rough and rotten cull	Total saw log	Sawtimber	Short-log
	-Thousand cubic feet-				-Thousand board feet[1]-		
Softwoods							
Jack pine	206,233	190,546	1,961	13,726	422,926	416,129	6,797
Red pine	235,256	232,454	137	2,665	326,159	325,587	572
White pine	186,684	172,290	6,945	7,449	795,158	772,302	22,856
White spruce	905	905	--	--	3,147	3,147	--
Black spruce	3,982	3,982	--	--	3,038	3,038	--
Balsam fir	17,699	16,335	--	1,364	18,838	18,838	--
Hemlock	29,570	26,895	641	2,034	89,779	88,210	1,569
Tamarack	26,885	25,976	191	718	35,708	34,873	835
Eastern redcedar	680	405	--	275	1,272	1,272	--
Northern white-cedar	33,756	30,702	415	2,639	41,846	40,436	1,410
Scotch pine	3,332	2,565	364	403	8,058	6,238	1,820
Total	744,982	703,055	10,654	31,273	1,745,929	1,710,070	35,859
Hardwoods							
White oak	167,030	125,339	9,334	32,357	388,649	363,912	24,737
Swamp white oak	6,971	5,138	509	1,324	19,617	18,313	1,304
Bur oak	40,145	29,536	3,234	7,375	99,020	90,432	8,588
Northern red oak	391,969	336,908	14,390	40,671	1,138,966	1,106,582	32,384
Northern pin oak	172,808	106,847	9,774	56,187	268,012	245,829	22,183
Black oak	312,310	210,359	22,245	79,706	577,972	527,011	50,961
Shagbark hickory	7,595	5,344	429	1,822	15,229	13,982	1,247
Bitternut hickory	13,033	11,836	402	795	20,819	19,733	1,086
American basswood	85,591	75,883	1,704	8,004	216,903	213,198	3,705
Beech	1,535	1,092	--	443	4,749	4,749	--
Yellow birch	34,358	24,323	1,527	8,508	58,330	54,922	3,408
Sugar maple	140,765	115,891	6,855	18,019	358,295	341,476	16,819
Red maple	328,384	279,262	9,220	39,902	496,781	472,281	24,500
Silver maple	37,494	27,196	3,458	6,840	100,048	91,158	8,890
American elm	45,306	36,642	1,822	6,842	99,168	94,504	4,664
Slippery elm	2,988	2,319	--	669	5,123	5,123	--
Rock elm	4,487	4,164	--	323	9,885	9,885	--
Black ash	69,058	63,807	542	4,709	101,612	100,226	1,386
White ash	28,670	24,738	954	2,978	50,553	48,316	2,237
Green ash	16,896	13,944	--	2,952	48,420	48,420	--
Eastern cottonwood	3,010	2,368	188	454	10,747	10,173	574
Black willow	3,453	3,034	214	205	11,517	10,825	692
Hackberry	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--
Bigtooth aspen	160,862	153,865	1,187	5,810	268,119	266,184	1,935
Quaking aspen	376,660	351,029	1,408	24,223	331,498	328,348	3,150
Paper birch	147,747	127,154	798	19,795	57,513	55,304	2,209
River birch	4,304	2,706	--	1,598	5,566	5,566	--
Black cherry	27,408	16,345	357	10,706	11,999	10,963	1,036
Black walnut	566	220	--	346	1,275	1,275	--
Butternut	6,834	4,880	768	1,186	23,341	21,233	2,108
Boxelder	2,715	1,008	97	1,610	3,105	2,742	363
Black locust	3,780	2,633	361	786	4,269	3,001	1,268
Total	2,644,732	2,165,810	91,777	387,145	4,807,100	4,585,666	221,434
All species[2]	3,389,714	2,868,865	102,431	418,418	6,553,029	6,295,736	257,293

[1] International 1/4-inch rule.

[2] These totals do not include volume for noncommercial species. Volumes for individual noncommercial species are found in Table 25.

Table 25.--Net volume of noncommercial species on commercial forest land by individual species, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Species	Cull volume
Ailanthus	576
American hornbeam	360
Hawthorn	1,053
Eastern hophornbeam	4,837
Chokecherry	416
All species	7,242

Table 26.--Net volume of growing stock on commercial forest land by species group and county, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All counties	County							
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette
Softwoods									
Jack pine	190,546	36,638	2,511	3,282	9,405	52,358	42,794	412	1,824
Red pine	232,454	40,247	5,099	10,568	23,289	32,066	21,307	2,862	10,341
White pine	172,290	11,283	10,057	13,226	7,054	21,183	9,532	13,719	8,196
White spruce	905	--	449	--	--	--	--	208	--
Black spruce	3,982	--	175	1,614	--	--	--	938	--
Balsam fir	16,335	--	--	--	--	--	--	8,756	--
Hemlock	26,895	--	88	--	--	--	--	16,718	--
Tamarack	25,976	312	3,834	--	--	1,722	534	1,974	3,779
Eastern redcedar	405	--	--	--	--	214	95	--	96
Northern white-cedar	30,702	--	--	--	--	--	--	6,658	--
Other softwoods	2,565	--	--	--	--	822	--	--	846
Total	703,055	88,480	22,213	28,690	39,748	108,365	74,262	52,245	25,082
Hardwoods									
White oak	160,013	4,685	11,520	21,772	14,109	21,656	12,824	2,478	9,525
Select red oak	336,908	7,755	25,414	39,938	16,066	63,963	29,203	34,127	5,393
Other red oak	317,206	43,498	7,205	5,095	36,201	52,208	46,527	1,253	16,023
Select hickory	5,344	--	--	--	--	826	177	--	398
Other hickory	11,836	--	4,101	532	--	--	144	2,255	--
Basswood	75,883	637	15,470	11,172	4,073	106	2,102	24,002	1,280
Beech	1,092	--	--	--	--	--	--	--	--
Yellow birch	24,323	--	1,358	1,092	--	--	--	18,586	--
Hard maple	115,891	--	12,753	11,129	1,692	--	2,226	63,910	--
Soft maple	306,458	4,416	22,068	43,128	11,853	29,243	12,635	69,527	2,977
Elm	43,125	333	7,909	5,305	334	1,042	1,075	13,653	146
Black ash	63,807	727	14,586	8,869	629	--	364	10,371	1,454
White & green ash	38,682	--	6,085	3,781	274	316	1,387	11,330	1,411
Cottonwood	2,368	253	--	--	--	552	393	--	249
Willow	3,034	675	--	--	--	293	382	--	433
Hackberry	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--
Bigtooth aspen	153,865	3,467	21,179	26,347	5,675	28,832	6,752	17,031	--
Quaking aspen	351,029	11,083	30,744	88,189	28,532	29,235	25,040	50,195	3,132
Paper birch	127,154	1,736	18,041	18,430	8,908	12,988	7,776	18,747	537
River birch	2,706	--	--	--	669	859	587	--	--
Black cherry	16,345	563	555	961	1,366	1,492	1,032	2,049	173
Black walnut	220	--	--	--	--	--	220	--	--
Butternut	4,880	--	261	598	--	--	965	504	--
Other hardwoods	3,641	--	--	--	--	240	--	--	114
Total	2,165,810	79,828	199,249	286,338	130,381	243,851	151,811	340,018	43,245
All species	2,868,865	168,308	221,462	315,028	170,129	352,216	226,073	392,263	68,327

(Table 26 continued on next page)

(Table 26 continued)

Species group	County				
	Monroe	Portage	Waupaca	Waushara	Wood
Softwoods					
Jack pine	16,465	3,756	--	8,283	12,818
Red pine	1,898	26,602	17,976	38,917	1,282
White pine	15,534	12,894	20,445	15,789	13,378
White spruce	--	--	96	--	152
Black spruce	--	525	411	--	319
Balsam fir	--	66	7,513	--	--
Hemlock	--	1,962	7,982	--	145
Tamarack	--	3,379	5,325	5,117	--
Eastern redcedar	--	--	--	--	--
Northern white-cedar	--	6,975	14,995	2,074	--
Other softwoods	--	--	--	897	--
Total	33,897	56,159	74,743	71,077	28,094
Hardwoods					
White oak	13,366	10,187	8,561	15,888	13,442
Select red oak	49,727	15,040	21,145	6,326	22,811
Other red oak	33,067	21,590	8,485	34,437	11,617
Select hickory	2,398	--	207	1,338	--
Other hickory	340	695	3,769	--	--
Basswood	1,206	3,697	7,924	246	3,968
Beech	--	--	1,092	--	--
Yellow birch	--	392	2,658	--	237
Hard maple	2,829	3,804	14,030	--	3,518
Soft maple	15,320	15,902	42,695	6,148	30,546
Elm	2,058	1,581	7,411	1,299	979
Black ash	3,874	5,338	13,960	1,638	1,997
White & green ash	1,494	1,011	9,671	1,452	470
Cottonwood	331	--	--	590	--
Willow	--	--	1,251	--	--
Hackberry	--	--	--	--	--
Balsam poplar	--	--	--	--	--
Bigtooth aspen	12,271	5,499	9,925	7,428	9,459
Quaking aspen	8,231	19,683	8,538	1,722	46,705
Paper birch	15,826	5,369	7,870	5,561	5,365
River birch	--	--	--	--	591
Black cherry	2,585	2,448	1,916	893	312
Black walnut	--	--	--	--	--
Butternut	1,564	--	823	165	--
Other hardwoods	--	--	2,893	394	--
Total	166,487	112,236	174,824	85,525	152,017
All species	200,384	168,395	249,567	156,602	180,111

Table 27.--Net volume of sawtimber on commercial forest land by species group and county, Central Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All counties	County							
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette
Softwoods									
Jack pine	416,129	81,546	7,123	8,603	14,769	110,118	82,401	2,187	4,592
Red pine	325,587	20,487	28,031	46,413	7,717	53,586	44,733	6,570	--
White pine	772,302	35,080	52,459	72,588	36,903	89,217	40,323	70,183	29,024
White spruce	3,147	--	2,082	--	--	--	--	1,065	--
Black spruce	3,038	--	--	--	--	--	--	1,390	--
Balsam fir	18,838	--	--	--	--	--	--	10,798	--
Hemlock	88,210	--	--	--	--	--	--	55,025	--
Tamarack	34,873	1,699	--	--	--	--	--	933	5,376
Eastern redcedar	1,272	--	--	--	--	1,272	--	--	--
Northern white-cedar	40,436	--	--	--	--	--	--	10,914	--
Other softwoods	6,238	--	--	--	--	4,573	--	--	892
Total	1,710,070	138,812	89,695	127,604	59,389	258,766	167,457	159,065	39,884
Hardwoods									
White oak	472,657	8,980	28,864	58,994	31,210	44,748	42,910	10,372	42,287
Select red oak	1,106,582	24,656	83,878	115,347	54,353	207,378	87,423	100,493	17,536
Other red oak	772,840	82,503	23,389	7,627	66,530	125,553	112,975	5,539	65,354
Select hickory	13,982	--	--	--	--	3,483	861	--	1,483
Other hickory	19,733	--	6,513	1,275	--	--	--	3,869	--
Basswood	213,198	2,096	48,342	33,496	5,165	--	10,340	59,695	3,653
Beech	4,749	--	--	--	--	--	--	--	--
Yellow birch	54,922	--	2,975	--	--	--	--	47,976	--
Hard maple	341,476	--	33,183	34,654	1,387	--	11,438	184,487	--
Soft maple	563,439	8,226	26,114	46,804	14,149	46,892	25,134	150,477	10,446
Elm	109,512	1,431	16,087	14,081	1,129	606	4,498	35,553	693
Black ash	100,226	2,758	16,751	13,820	--	--	2,462	1,504	2,691
White & green ash	96,736	--	8,565	2,056	--	1,566	5,089	29,592	2,574
Cottonwood	10,173	1,132	--	--	--	2,557	1,810	--	1,078
Willow	10,825	2,278	--	--	--	1,345	--	--	1,855
Hackberry	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--
Bigtooth aspen	266,184	4,318	52,529	25,661	15,443	38,950	13,636	27,668	--
Quaking aspen	328,348	11,461	38,966	92,782	25,549	20,187	16,898	65,137	4,547
Paper birch	55,304	--	9,178	4,060	852	4,678	2,097	5,421	--
River birch	5,566	--	--	--	1,549	2,070	1,010	--	--
Black cherry	10,963	1,029	--	--	--	--	1,156	3,890	--
Black walnut	1,275	--	--	--	--	--	1,275	--	--
Butternut	21,233	--	1,348	3,258	--	--	3,413	1,147	--
Other hardwoods	5,743	--	--	--	--	--	--	--	--
Total	4,585,666	150,868	396,682	453,915	217,316	500,013	344,425	732,820	154,197
All species	6,295,736	289,680	486,377	581,519	276,705	758,779	511,882	891,885	194,081

(Table 27 continued on next page)

[1/] International 1/4-inch rule.

(Table 27 continued)

Species group	County				
	Monroe	Portage	Waupaca	Waushara	Wood
Softwoods					
Jack pine	43,385	5,910	--	24,180	31,315
Red pine	6,682	40,259	33,205	30,491	7,413
White pine	71,444	61,914	95,561	58,355	59,251
White spruce	--	--	--	--	--
Black spruce	--	--	1,648	--	--
Balsam fir	--	--	8,040	--	--
Hemlock	--	3,740	28,951	--	494
Tamarack	--	8,854	4,035	13,976	--
Eastern redcedar	--	--	--	--	--
Northern white-cedar	--	11,385	16,681	1,456	--
Other softwoods	--	--	--	773	--
Total	121,511	132,062	188,121	129,231	98,473
Hardwoods					
White oak	47,037	37,875	30,892	40,582	47,906
Select red oak	174,869	52,716	85,555	12,854	89,524
Other red oak	72,329	68,644	25,148	88,274	28,975
Select hickory	5,170	--	985	2,000	--
Other hickory	869	2,718	4,489	--	--
Basswood	3,291	4,064	30,449	1,189	11,418
Beech	--	--	4,749	--	--
Yellow birch	--	--	2,969	--	1,002
Hard maple	9,750	5,235	53,984	--	7,358
Soft maple	23,186	34,865	108,684	15,502	52,960
Elm	6,343	1,643	20,803	3,254	3,391
Black ash	18,751	10,022	24,649	1,308	5,510
White & green ash	2,527	4,224	37,983	1,535	1,025
Cottonwood	1,065	--	--	2,531	--
Willow	--	--	5,347	--	--
Hackberry	--	--	--	--	--
Balsam poplar	--	--	--	--	--
Bigtooth aspen	29,467	12,713	25,293	8,962	11,544
Quaking aspen	3,227	15,535	1,299	778	31,982
Paper birch	9,490	6,680	7,110	3,684	2,054
River birch	--	--	--	--	937
Black cherry	3,537	1,351	--	--	--
Black walnut	--	--	--	--	--
Butternut	6,529	--	4,476	1,062	--
Other hardwoods	--	--	5,743	--	--
Total	417,437	258,285	480,607	183,515	295,586
All species	538,948	390,347	668,728	312,746	394,059

Table 28.--Net volume of growing stock on commercial forest land by species group and diameter class, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	190,546	49,151	61,124	47,022	24,754	6,876	1,619	--	--	--	--	--	--
Red pine	232,454	100,819	74,848	23,053	10,072	9,496	7,085	5,040	1,410	631	--	--	--
White pine	172,290	10,333	15,087	15,864	16,939	20,692	23,878	18,400	18,981	13,838	11,429	6,849	--
White spruce	905	248	--	205	244	208	--	--	--	--	--	--	--
Black spruce	3,982	2,938	346	411	287	--	--	--	--	--	--	--	--
Balsam fir	16,335	6,346	5,631	3,146	1,212	--	--	--	--	--	--	--	--
Hemlock	26,895	2,223	3,874	4,991	4,374	3,723	2,991	1,730	1,324	220	1,445	--	--
Tamarack	25,976	10,415	9,012	2,577	2,213	1,147	408	204	--	--	--	--	--
Eastern redcedar	405	95	96	214	--	--	--	--	--	--	--	--	--
Northern white-cedar	30,702	10,820	11,700	4,492	3,165	525	--	--	--	--	--	--	--
Other softwoods	2,565	1,000	442	139	686	--	298	--	--	--	--	--	--
Total	703,055	194,388	182,160	102,114	63,946	42,667	36,279	25,374	21,715	14,689	12,874	6,849	--
Hardwoods													
White oak	160,013	18,303	21,955	27,945	25,349	22,462	18,312	11,968	4,862	4,169	3,740	948	--
Select red oak	336,908	17,210	38,825	55,235	57,177	40,832	39,795	32,153	21,390	13,821	16,384	4,086	--
Other red oak	317,206	33,421	54,130	68,076	55,585	36,090	29,508	15,046	10,902	6,554	7,278	616	--
Select hickory	5,344	167	1,168	1,201	391	1,315	705	--	--	397	--	--	--
Other hickory	11,836	2,491	3,401	2,055	2,781	671	437	--	--	--	--	--	--
Basswood	75,883	3,141	10,504	18,000	13,099	11,023	8,362	5,656	2,064	1,869	2,165	--	--
Beech	1,092	--	197	--	445	214	236	--	--	--	--	--	--
Yellow birch	24,323	2,544	4,601	4,780	5,544	3,502	2,214	686	230	--	--	222	--
Hard maple	115,891	14,812	16,453	16,140	16,440	15,671	14,323	10,077	5,152	4,120	2,182	521	--
Soft maple	306,458	78,892	65,566	51,643	36,162	26,808	19,643	9,371	4,271	5,235	7,580	1,287	--
Elm	43,125	5,424	4,426	7,935	8,339	7,879	4,401	2,235	560	1,017	684	225	--
Black ash	63,807	19,376	14,633	13,161	8,844	4,850	1,755	630	558	--	--	--	--
White & green ash	38,682	6,350	4,413	9,781	6,834	3,701	3,082	2,233	1,471	535	282	--	--
Cottonwood	2,368	--	98	--	--	190	--	249	400	--	445	986	--
Willow	3,034	--	110	411	347	415	200	463	463	--	332	293	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	153,865	18,162	35,032	42,552	29,993	17,086	8,165	2,066	--	256	553	--	--
Quaking aspen	351,029	84,704	112,742	86,032	41,955	17,424	6,804	1,124	244	--	--	--	--
Paper birch	127,154	53,148	40,620	22,357	7,596	2,917	516	--	--	--	--	--	--
River birch	2,706	--	672	837	559	--	--	--	415	--	223	--	--
Black cherry	16,345	5,139	4,150	5,104	660	656	206	430	--	--	--	--	--
Black walnut	220	--	--	--	--	220	--	--	--	--	--	--	--
Butternut	4,880	--	919	--	449	1,048	439	1,232	609	--	184	--	--
Other hardwoods	3,641	636	368	1,609	708	320	--	--	--	--	--	--	--
Total	2,165,810	363,920	434,983	434,854	319,257	215,294	159,103	95,619	53,591	37,973	42,032	9,184	--
All species	2,868,865	558,308	617,143	536,968	383,203	257,961	195,382	120,993	75,306	52,662	54,906	16,033	--

Table 29.--Net volume of sawtimber on commercial forest land by species group and diameter class, Central Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	416,129	244,382	127,658	35,633	8,456	--	--	--	--	--	--
Red pine	325,587	133,076	57,537	53,931	40,374	28,884	8,130	3,655	--	--	--
White pine	772,302	62,973	78,695	104,616	127,120	101,869	107,503	79,998	67,688	41,840	--
White spruce	3,147	900	1,182	1,065	--	--	--	--	--	--	--
Black spruce	3,038	1,648	1,390	--	--	--	--	--	--	--	--
Balsam fir	18,838	13,208	5,630	--	--	--	--	--	--	--	--
Hemlock	88,210	17,732	17,874	16,223	13,652	8,083	6,389	1,071	7,186	--	--
Tamarack	34,873	13,381	11,789	6,288	2,274	1,141	--	--	--	--	--
Eastern redcedar	1,272	1,272	--	--	--	--	--	--	--	--	--
Northern white-cedar	40,436	21,782	15,926	2,728	--	--	--	--	--	--	--
Other softwoods	6,238	773	3,793	--	1,672	--	--	--	--	--	--
Total	1,710,070	511,127	321,474	220,484	193,548	139,977	122,022	84,724	74,874	41,840	--
Hardwoods											
White oak	472,657	--	140,269	115,506	91,317	58,897	23,847	20,180	18,036	4,605	--
Select red oak	1,106,582	--	279,286	197,904	192,961	157,370	105,589	69,017	83,234	21,221	--
Other red oak	772,840	--	266,167	170,755	140,637	72,163	52,324	31,777	35,914	3,103	--
Select hickory	13,982	--	2,022	6,583	3,485	--	--	1,892	--	--	--
Other hickory	19,733	--	14,392	3,279	2,062	--	--	--	--	--	--
Basswood	213,198	--	61,485	52,867	40,373	27,778	10,329	9,390	10,976	--	--
Beech	4,749	--	2,390	1,159	1,200	--	--	--	--	--	--
Yellow birch	54,922	--	22,617	15,818	10,546	3,432	1,202	--	--	1,307	--
Hard maple	341,476	--	78,551	76,596	71,920	51,446	26,690	21,699	11,703	2,871	--
Soft maple	563,439	--	199,701	137,915	95,894	44,487	20,130	24,420	34,963	5,929	--
Elm	109,512	--	34,273	34,129	19,383	10,015	2,614	4,736	3,284	1,078	--
Black ash	100,226	--	56,618	28,004	9,427	3,317	2,860	--	--	--	--
White & green ash	96,736	--	39,890	19,539	15,304	11,028	7,103	2,542	1,330	--	--
Cottonwood	10,173	--	--	791	--	1,078	1,740	--	2,008	4,556	--
Willow	10,825	--	1,481	1,713	843	1,964	1,999	--	1,480	1,345	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	266,184	--	134,222	79,158	38,656	10,037	--	1,284	2,827	--	--
Quaking aspen	328,348	--	197,826	87,415	35,634	6,122	1,351	--	--	--	--
Paper birch	55,304	--	37,495	15,063	2,746	--	--	--	--	--	--
River birch	5,566	--	2,559	--	--	--	1,947	--	1,060	--	--
Black cherry	10,963	--	3,929	3,842	1,029	2,163	--	--	--	--	--
Black walnut	1,275	--	--	1,275	--	--	--	--	--	--	--
Butternut	21,233	--	2,651	5,840	2,367	6,327	3,129	--	919	--	--
Other hardwoods	5,743	--	3,925	1,818	--	--	--	--	--	--	--
Total	4,585,666	--	1,581,749	1,056,969	775,784	467,624	262,854	186,937	207,734	46,015	--
All species	6,295,736	511,127	1,903,223	1,277,453	969,332	607,601	384,876	271,661	282,608	87,855	--

[1/] International 1/4-inch rule.

Table 30.--Net volume of growing stock on commercial forest land by species group and forest type, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	190,546	113,248	5,705	5,149	--	--	--	--
Red pine	232,454	6,570	200,820	11,284	539	--	--	--
White pine	172,290	2,819	6,436	74,502	1,822	--	--	637
White spruce	905	--	96	--	--	152	--	--
Black spruce	3,982	--	346	--	--	--	1,145	424
Balsam fir	16,335	--	--	--	4,693	--	--	3,257
Hemlock	26,895	--	--	--	--	--	--	1,193
Tamarack	25,976	--	--	370	--	--	896	1,126
Eastern redcedar	405	214	--	--	--	--	--	--
Northern white-cedar	30,702	--	--	--	--	--	--	20,521
Other softwoods	2,565	--	1,722	--	--	--	--	--
Total	703,055	122,851	215,125	91,305	7,054	152	2,041	27,158
Hardwoods								
White oak	160,013	753	368	2,382	--	--	--	--
Select red oak	336,908	2,058	775	781	171	--	--	163
Other red oak	317,206	8,999	3,206	6,446	--	--	--	144
Select hickory	5,344	--	--	334	--	--	--	--
Other hickory	11,836	--	--	--	--	--	--	--
Basswood	75,883	--	209	--	167	--	--	296
Beech	1,092	--	418	--	--	--	--	--
Yellow birch	24,323	--	--	370	--	--	--	338
Hard maple	115,891	--	796	1,514	-	--	--	--
Soft maple	306,458	--	212	3,692	149	--	--	778
Elm	43,125	--	--	--	187	--	--	310
Black ash	63,807	--	--	867	924	--	--	1,063
White & green ash	38,682	--	416	--	--	--	--	--
Cottonwood	2,368	98	--	--	--	--	--	--
Willow	3,034	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--
Bigtooth aspen	153,865	908	212	2,358	--	--	--	--
Quaking aspen	351,029	3,783	160	7,910	--	--	--	981
Paper birch	127,154	395	--	1,235	479	--	--	1,449
River birch	2,706	--	--	--	--	--	--	--
Black cherry	16,345	--	--	948	--	--	--	--
Black walnut	220	--	--	--	--	--	--	--
Butternut	4,880	--	--	--	--	--	--	--
Other hardwoods	3,641	--	--	--	--	--	--	--
Total	2,165,810	16,994	6,772	28,837	2,077	--	--	5,522
All species	2,868,865	139,845	221,897	120,142	9,131	152	2,041	32,680

(Table 30 continued on next page)

(Table 30 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	42,821	863	3,893	17,041	1,642	--	184
Red pine	--	5,468	387	2,775	2,445	2,166	--	--
White pine	869	28,469	11,684	34,456	5,994	4,602	--	--
White spruce	--	--	208	449	--	--	--	--
Black spruce	--	--	411	287	1,369	--	--	--
Balsam fir	--	445	1,699	5,266	686	289	--	--
Hemlock	--	145	2,322	23,057	178	--	--	--
Tamarack	17,386	--	4,696	--	483	593	--	426
Eastern redcedar	--	191	--	--	--	--	--	--
Northern white-cedar	270	238	4,242	4,135	--	1,296	--	--
Other softwoods	--	287	--	--	--	--	556	--
Total	18,525	78,064	26,512	74,318	28,196	10,588	556	610
Hardwoods								
White oak	--	116,424	7,918	17,711	8,518	5,473	--	466
Select red oak	--	242,013	8,773	52,333	23,865	5,821	--	155
Other red oak	--	258,680	5,530	10,724	21,112	976	--	1,389
Select hickory	--	4,037	207	--	--	766	--	--
Other hickory	--	4,936	--	6,103	797	--	--	--
Basswood	--	7,850	10,153	52,988	3,306	426	--	488
Beech	--	--	--	674	--	--	--	--
Yellow birch	86	648	4,007	18,342	--	532	--	--
Hard maple	--	10,464	1,025	96,882	3,108	2,102	--	--
Soft maple	584	50,084	88,671	102,929	53,386	5,973	--	--
Elm	125	4,577	12,157	21,140	2,394	1,373	--	862
Black ash	--	2,321	42,314	8,540	5,479	1,813	--	486
White & green ash	--	6,613	8,600	21,490	972	591	--	--
Cottonwood	--	1,159	393	253	232	233	--	--
Willow	--	--	1,344	433	1,057	200	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--
Bigtooth aspen	558	48,866	187	20,090	76,407	4,279	--	--
Quaking aspen	851	32,999	16,460	33,131	241,457	12,855	--	442
Paper birch	530	23,514	9,800	18,878	33,631	36,968	--	275
River birch	--	525	2,181	--	--	--	--	--
Black cherry	--	6,879	2,098	4,177	1,838	405	--	--
Black walnut	--	--	--	220	--	--	--	--
Butternut	--	2,129	--	2,158	282	311	--	--
Other hardwoods	--	370	2,893	114	264	--	--	--
Total	2,734	825,088	224,711	489,310	478,105	81,097	--	4,563
All species	21,259	903,152	251,223	563,628	506,301	91,685	556	5,173

Table 31.--Net volume of sawtimber on commercial forest land by species group and forest type, Central Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	416,129	216,356	10,606	11,650	--	--	--	--
Red pine	325,587	20,778	201,784	43,508	3,124	--	--	--
White pine	772,302	11,742	11,584	332,967	9,527	--	--	1,984
White spruce	3,147	--	--	--	--	--	--	--
Black spruce	3,038	--	--	--	--	--	--	--
Balsam fir	18,838	--	--	--	5,391	--	--	2,774
Hemlock	88,210	--	--	--	--	--	--	3,506
Tamarack	34,873	--	--	1,959	--	--	--	854
Eastern redcedar	1,272	1,272	--	--	--	--	--	--
Northern white-cedar	40,436	--	--	--	--	--	--	24,515
Other softwoods	6,238	--	6,238	--	--	--	--	--
Total	1,710,070	250,148	230,212	390,084	18,042	--	--	33,633
Hardwoods								
White oak	472,657	--	2,079	7,601	--	--	--	--
Select red oak	1,106,582	6,145	1,742	3,016	850	--	--	822
Other red oak	772,840	19,446	9,386	16,898	--	--	--	711
Select hickory	13,982	--	--	--	--	--	--	--
Other hickory	19,733	--	--	--	--	--	--	--
Basswood	213,198	--	960	--	855	--	--	1,567
Beech	4,749	--	1,110	--	--	--	--	--
Yellow birch	54,922	--	--	1,307	--	--	--	--
Hard maple	341,476	--	895	7,033	--	--	--	--
Soft maple	563,439	--	1,084	5,818	--	--	--	1,816
Elm	109,512	--	--	--	--	--	--	707
Black ash	100,226	--	--	5,002	1,392	--	--	997
White & green ash	96,736	--	2,188	--	--	--	--	--
Cottonwood	10,173	--	--	--	--	--	--	--
Willow	10,825	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--
Bigtooth aspen	266,184	800	--	867	--	--	--	--
Quaking aspen	328,348	--	--	2,159	--	--	--	2,475
Paper birch	55,304	--	--	--	--	--	--	780
River birch	5,566	--	--	--	--	--	--	--
Black cherry	10,963	--	--	--	--	--	--	--
Black walnut	1,275	--	--	--	--	--	--	--
Butternut	21,233	--	--	--	--	--	--	--
Other hardwoods	5,743	--	--	--	--	--	--	--
Total	4,585,666	26,391	19,444	49,701	3,097	--	--	9,875
All species	6,295,736	276,539	249,656	439,785	21,139	--	--	43,508

(Table 31 continued on next page)

[1/] International 1/4-inch rule.

(Table 31 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	98,735	3,321	12,402	59,242	3,817	--	--
Red pine	--	18,515	2,220	13,036	9,942	12,680	--	--
White pine	3,921	129,376	52,574	171,672	29,836	17,119	--	--
White spruce	--	--	1,065	2,082	--	--	--	--
Black spruce	--	--	1,648	1,390	--	--	--	--
Balsam fir	--	--	2,910	6,885	878	--	--	--
Hemlock	--	494	5,560	77,924	726	--	--	--
Tamarack	13,383	--	12,705	--	2,652	980	--	2,340
Eastern redcedar	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	4,132	9,600	--	2,189	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	17,304	247,120	86,135	294,991	103,276	36,785	--	2,340
Hardwoods								
White oak	--	328,394	30,939	57,848	23,614	20,506	--	1,676
Select red oak	--	789,672	35,438	187,451	56,506	24,129	--	811
Other red oak	--	601,836	23,955	37,681	56,351	4,462	--	2,114
Select hickory	--	10,426	985	--	--	2,571	--	--
Other hickory	--	6,678	--	13,055	--	--	--	--
Basswood	--	22,560	17,225	158,592	10,122	1,317	--	--
Beech	--	--	--	3,639	--	--	--	--
Yellow birch	--	905	7,373	43,601	--	1,736	--	--
Hard maple	--	27,151	2,873	300,352	926	2,246	--	--
Soft maple	766	76,557	223,795	212,469	31,284	9,850	--	--
Elm	--	9,794	31,187	58,172	6,877	641	--	2,134
Black ash	--	1,545	70,721	16,147	1,664	2,758	--	--
White & green ash	--	8,978	34,949	49,088	--	1,533	--	--
Cottonwood	--	5,080	1,810	1,132	1,086	1,065	--	--
Willow	--	--	5,849	1,855	2,278	843	--	--
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--
Bigtooth aspen	1,961	83,614	--	36,150	128,807	13,985	--	--
Quaking aspen	--	35,592	28,679	51,367	196,746	11,330	--	--
Paper birch	--	9,032	6,600	17,412	4,111	17,369	--	--
River birch	--	1,010	4,556	--	--	--	--	--
Black cherry	--	3,478	--	6,420	--	1,065	--	--
Black walnut	--	--	--	1,275	--	--	--	--
Butternut	--	9,583	--	11,650	--	--	--	--
Other hardwoods	--	--	5,743	--	--	--	--	--
Total	2,727	2,031,885	532,677	1,265,356	520,372	117,406	--	6,735
All species	20,031	2,279,005	618,812	1,560,347	623,648	154,191	--	9,075

Table 32.--Net volume of growing stock on commercial forest land by species group and ownership class, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	190,546	--	20,076	12,423	20,981	3,247	9,439	32,633	7,555	84,192
Red pine	232,454	--	8,932	10,871	28,377	--	15,644	46,747	16,677	105,206
White pine	172,290	--	9,322	7,304	10,072	--	4,557	63,048	5,320	72,667
White spruce	905	--	--	--	--	--	--	657	--	248
Black spruce	3,982	--	--	319	1,789	--	287	752	--	835
Balsam fir	16,335	--	--	--	--	--	474	10,393	2,545	2,923
Hemlock	26,895	--	--	608	--	--	3,579	17,062	2,307	3,339
Tamarack	25,976	--	534	335	1,696	--	312	12,662	--	10,437
Eastern redcedar	405	--	--	--	--	--	--	405	--	--
Northern white-cedar	30,702	--	--	1,707	--	--	1,052	16,118	1,169	10,656
Other softwoods	2,565	--	--	--	--	--	--	1,024	139	1,402
Total	703,055	--	38,864	33,567	62,915	3,247	35,344	201,501	35,712	291,905
Hardwoods										
White oak	160,013	--	1,347	1,056	15,048	--	1,092	76,899	9,542	55,029
Select red oak	336,908	--	9,595	5,006	34,671	282	9,694	159,992	11,271	106,397
Other red oak	317,206	--	13,446	13,512	30,692	--	6,463	90,280	16,496	146,317
Select hickory	5,344	--	--	--	--	--	--	3,060	--	2,284
Other hickory	11,836	--	--	480	580	--	2,959	5,853	--	1,964
Basswood	75,883	--	--	256	6,355	--	7,578	24,626	5,612	31,456
Beech	1,092	--	--	--	--	--	--	438	--	654
Yellow birch	24,323	--	--	155	165	--	6,273	10,061	2,035	5,634
Hard maple	115,891	--	--	1,169	2,959	--	15,025	48,384	4,591	43,763
Soft maple	306,458	--	9,331	3,073	32,099	1,529	19,435	105,334	9,951	125,706
Elm	43,125	--	--	1,376	1,751	--	2,600	22,137	1,228	14,033
Black ash	63,807	--	--	2,301	4,143	--	1,813	35,525	187	19,838
White & green ash	38,682	--	--	--	1,077	--	2,707	19,649	2,268	12,981
Cottonwood	2,368	--	--	--	--	--	--	1,396	491	481
Willow	3,034	--	--	675	--	--	--	1,684	--	675
Hackberry	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	153,865	--	5,183	3,190	36,591	--	3,194	53,219	2,459	50,029
Quaking aspen	351,029	--	15,366	13,842	88,570	2,320	14,391	84,134	10,773	121,633
Paper birch	127,154	--	2,167	1,456	23,179	--	3,913	51,384	3,245	41,810
River birch	2,706	--	--	--	126	--	--	921	--	1,659
Black cherry	16,345	--	--	468	470	--	926	9,372	--	5,109
Black walnut	220	--	--	--	--	--	--	--	220	--
Butternut	4,880	--	--	--	--	--	284	2,983	605	1,008
Other hardwoods	3,641	--	--	--	--	--	--	504	--	3,137
Total	2,165,810	--	56,435	48,015	278,476	4,131	98,347	807,835	80,974	791,597
All species	2,868,865	--	95,299	81,582	341,391	7,378	133,691	1,009,336	116,686	1,083,502

Table 33.--Net volume of sawtimber on commercial forest land by species group and ownership class, Central Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	416,129	--	51,002	30,864	34,775	12,072	12,160	92,104	15,605	167,547
Red pine	325,587	--	33,546	12,397	62,609	--	13,229	78,889	11,473	113,444
White pine	772,302	--	39,272	27,286	49,391	--	20,325	311,777	24,422	299,829
White spruce	3,147	--	--	--	--	--	--	3,147	--	--
Black spruce	3,038	--	--	--	--	--	1,390	--	--	1,648
Balsam fir	18,838	--	--	--	--	--	740	13,759	3,173	1,166
Hemlock	88,210	--	--	1,637	--	--	12,918	54,755	8,932	9,968
Tamarack	34,873	--	--	--	--	--	1,699	14,321	--	18,853
Eastern redcedar	1,272	--	--	--	--	--	--	1,272	--	--
Northern white-cedar	40,436	--	--	5,678	--	--	--	16,536	--	18,222
Other softwoods	6,238	--	--	--	--	--	--	4,573	773	892
Total	1,710,070	--	123,820	77,862	146,775	12,072	62,461	591,133	64,378	631,569
Hardwoods										
White oak	472,657	--	3,554	3,012	24,381	--	3,410	268,906	22,471	146,923
Select red oak	1,106,582	--	16,499	10,022	74,933	--	34,156	584,915	36,797	349,260
Other red oak	772,840	--	24,737	40,821	65,396	--	15,264	226,015	34,988	365,619
Select hickory	13,982	--	--	--	--	--	--	7,265	--	6,717
Other hickory	19,733	--	--	1,710	--	--	3,526	9,846	--	4,651
Basswood	213,198	--	--	--	10,293	--	22,625	82,802	12,607	84,871
Beech	4,749	--	--	--	--	--	--	2,439	--	2,310
Yellow birch	54,922	--	--	--	--	--	20,188	18,181	3,678	12,875
Hard maple	341,476	--	--	3,843	1,091	--	53,579	140,798	23,041	119,124
Soft maple	563,439	--	14,131	1,136	17,065	--	31,198	262,944	22,407	214,558
Elm	109,512	--	--	2,693	3,679	--	9,179	55,402	1,544	37,015
Black ash	100,226	--	--	5,395	--	--	4,350	65,538	--	24,943
White & green ash	96,736	--	--	--	1,052	--	11,437	45,648	8,995	29,604
Cottonwood	10,173	--	--	--	--	--	--	6,199	1,810	2,164
Willow	10,825	--	--	2,278	--	--	--	7,202	--	1,345
Hackberry	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	266,184	--	5,356	1,552	41,856	--	6,595	125,000	1,969	83,856
Quaking aspen	328,348	--	9,247	9,051	50,742	--	20,468	102,286	3,253	133,301
Paper birch	55,304	--	913	--	2,430	--	4,678	24,820	4,282	18,181
River birch	5,566	--	--	--	--	--	--	2,070	--	3,496
Black cherry	10,963	--	--	1,331	--	--	--	7,538	--	2,094
Black walnut	1,275	--	--	--	--	--	--	--	1,275	-
Butternut	21,233	--	--	--	--	--	1,589	12,674	3,407	3,563
Other hardwoods	5,743	--	--	--	--	--	--	--	--	5,743
Total	4,585,666	--	74,437	82,844	292,918	--	242,242	2,058,488	182,524	1,652,213
All species	6,295,736	--	198,257	160,706	439,693	12,072	304,703	2,649,621	246,902	2,283,782

[1/] International 1/4-inch rule.

Table 34.--Net volume of growing stock on commercial forest land by forest type and stand-age class, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	139,845	343	18,075	15,696	35,311	46,971	15,396	4,387	3,666	--	--	--	--	--
Red pine	221,897	152	34,557	109,825	47,666	5,630	18,138	--	--	--	5,929	--	--	--
White pine	120,142	281	6,238	--	11,248	17,036	6,219	20,893	13,355	19,821	1,276	11,862	4,692	7,221
Balsam fir	9,131	5,652	1,771	267	--	1,441	--	--	--	--	--	--	--	--
White spruce	152	--	152	--	--	--	--	--	--	--	--	--	--	--
Black spruce	2,041	175	1,036	--	--	830	--	--	--	--	--	--	--	--
Northern white-cedar	32,680	--	--	--	--	--	15,312	4,986	5,955	1,846	4,581	--	--	--
Tamarack	21,259	1,804	1,712	--	1,513	3,059	3,700	4,120	3,257	2,094	--	--	--	--
Oak-hickory	903,152	30,329	13,343	14,702	46,955	144,809	201,248	128,935	133,989	59,326	50,492	46,886	17,682	14,456
Elm-ash-soft maple	251,223	15,140	8,629	136	20,697	42,539	23,909	21,113	56,724	29,286	19,395	11,504	2,151	--
Maple-birch	563,628	18,618	27,045	21,404	34,286	55,249	80,018	93,921	53,568	74,030	54,190	25,850	15,118	10,331
Aspen	506,301	29,725	25,793	37,660	93,756	181,248	78,516	6,206	28,037	19,894	5,466	--	--	--
Paper birch	91,685	3,020	11,841	5,904	31,211	6,947	16,847	14,065	1,850	--	--	--	--	--
Exotic	556	--	556	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	5,173	5,173	--	--	--	--	--	--	--	--	--	--	--	--
All types	2,868,865	110,412	150,748	205,594	322,643	505,759	459,303	298,626	300,401	206,297	141,329	96,102	39,643	32,008

Table 35.--Net volume of sawtimber on commercial forest land by forest type and stand-age class, Central Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	276,539	684	16,788	12,772	63,921	98,346	52,308	14,270	17,450	--	--	--	--	--
Red pine	249,656	790	23,630	60,393	34,132	22,393	76,006	--	--	--	32,312	--	--	--
White pine	439,785	--	3,121	--	30,235	56,332	21,988	78,115	46,671	82,213	7,384	55,894	22,149	35,683
Balsam fir	21,139	16,261	850	855	--	3,173	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	43,508	--	--	--	--	--	13,834	6,707	10,944	2,218	9,805	--	--	--
Tamarack	20,031	3,921	766	--	--	1,961	868	4,035	5,251	3,229	--	--	--	--
Oak-hickory	2,279,005	58,000	36,812	30,063	73,776	199,398	380,084	350,457	423,172	220,138	189,851	186,942	67,462	62,850
Elm-ash-soft maple	618,812	24,728	12,211	-	35,507	66,551	39,723	38,481	172,809	93,584	80,744	44,242	10,232	--
Maple-birch	1,560,347	39,724	61,519	43,536	62,907	101,336	161,664	240,827	181,600	257,316	207,592	91,666	67,653	43,007
Aspen	623,648	37,520	17,547	36,022	106,358	177,582	89,689	20,828	71,694	44,408	22,000	--	--	--
Paper birch	154,191	4,186	16,244	4,558	40,479	8,581	27,358	47,633	5,150	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	9,075	9,075	--	--	--	--	--	--	--	--	--	--	--	--
All types	6,295,736	194,891	189,456	188,199	447,315	735,653	863,522	801,353	934,741	705,106	549,682	378,744	167,496	141,540

[1/] International 1/4-inch rule

Table 36.--Net volume of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	27,508	--	--	--	811	--	3,820	1,559
Poletimber	89,310	--	--	--	2,059	2,037	6,154	6,382
Sapling & seedling	23,027	--	662	873	475	1,202	2,910	4,714
All stands	139,845	--	662	873	3,345	3,239	12,884	12,655
Red pine								
Sawtimber	38,233	--	--	--	--	--	--	--
Poletimber	177,318	--	--	--	--	--	1,769	1,713
Sapling & seedling	6,346	152	--	--	222	--	--	--
All stands	221,897	152	--	--	222	--	1,769	1,713
White pine								
Sawtimber	103,194	--	647	--	--	--	1,276	--
Poletimber	14,359	--	--	--	--	--	1,173	--
Sapling & seedling	2,589	--	--	--	--	281	918	--
All stands	120,142	--	647	--	--	281	3,367	--
Balsam fir								
Sawtimber	1,441	--	--	--	--	1,441	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	7,690	--	--	267	--	2,154	--	1,771
All stands	9,131	--	--	267	--	3,595	--	1,771
White spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	152	--	--	--	--	--	--	--
All stands	152	--	--	--	--	--	--	--
Black spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	2,041	175	319	--	--	183	534	--
All stands	2,041	175	319	--	--	183	534	--
Northern white-cedar								
Sawtimber	2,042	--	--	--	--	--	--	--
Poletimber	30,067	--	--	--	--	--	--	--
Sapling & seedling	571	--	--	--	--	--	--	--
All stands	32,680	--	--	--	--	--	--	--

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	2,045	4,365	3,247	7,958	3,703	--	--
Poletimber	13,618	26,397	12,210	12,510	2,685	--	5,258
Sapling & seedling	12,191	--	--	--	--	--	--
All stands	27,854	30,762	15,457	20,468	6,388	--	5,258
Red pine							
Sawtimber	2,598	7,770	3,898	8,215	9,682	6,070	--
Poletimber	4,874	5,370	3,802	27,530	34,050	21,632	76,578
Sapling & seedling	2,472	1,531	--	1,969	--	--	--
All stands	9,944	14,671	7,700	37,714	43,732	27,702	76,578
White pine							
Sawtimber	8,319	9,167	6,915	37,569	33,220	6,081	--
Poletimber	--	1,628	--	2,620	--	8,938	--
Sapling & seedling	1,390	--	--	--	--	--	--
All stands	9,709	10,795	6,915	40,189	33,220	15,019	--
Balsam fir							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	3,498	--	--	--	--	--	--
All stands	3,498	--	--	--	--	--	--
White spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	152	--	--	--	--	--	--
All stands	152	--	--	--	--	--	--
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	830	--	--	--
All stands	--	--	--	830	--	--	--
Northern white-cedar							
Sawtimber	2,042	--	--	--	--	--	--
Poletimber	--	--	--	1,846	3,032	5,955	19,234
Sapling & seedling	--	--	--	571	--	--	--
All stands	2,042	--	--	2,417	3,032	5,955	19,234

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	970	--	--	970	--	--	--	--
Poletimber	16,773	--	--	--	1,199	1,513	--	--
Sapling & seedling	3,516	115	259	--	--	2,025	--	1,117
All stands	21,259	115	259	970	1,199	3,538	--	1,117
Oak-hickory								
Sawtimber	463,999	--	--	1,203	840	13,017	19,397	21,720
Poletimber	391,293	--	--	--	2,793	1,076	30,349	13,682
Sapling & seedling	47,860	180	1,116	8,392	3,317	10,829	10,825	7,849
All stands	903,152	180	1,116	9,595	6,950	24,922	60,571	43,251
Elm-ash-soft maple								
Sawtimber	133,046	--	450	1,107	--	3,873	1,905	4,393
Poletimber	94,272	--	2,759	758	4,326	4,246	9,362	6,641
Sapling & seedling	23,905	247	1,411	1,077	3,793	2,356	7,636	2,099
All stands	251,223	247	4,620	2,942	8,119	10,475	18,903	13,133
Maple-birch								
Sawtimber	334,782	--	--	2,058	--	8,144	9,250	2,729
Poletimber	168,266	--	--	2,034	2,272	2,754	8,166	9,210
Sapling & seedling	60,580	378	2,033	4,612	4,450	6,910	6,452	4,764
All stands	563,628	378	2,033	8,704	6,722	17,808	23,868	16,703
Aspen								
Sawtimber	97,348	--	627	--	571	3,302	2,395	2,177
Poletimber	335,599	--	438	873	2,281	8,743	20,115	27,083
Sapling & seedling	73,354	500	5,949	4,165	9,877	20,442	8,414	12,204
All stands	506,301	500	7,014	5,038	12,729	32,487	30,924	41,464
Paper birch								
Sawtimber	15,915	--	--	--	--	--	--	6,299
Poletimber	57,134	--	--	--	--	2,300	2,874	1,078
Sapling & seedling	18,636	--	1,403	1,711	3,153	2,925	4,096	--
All stands	91,685	--	1,403	1,711	3,153	5,225	6,970	7,377
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	556	--	--	--	--	--	--	--
All stands	556	--	--	--	--	--	--	--
Nonstocked	5,173	426	1,332	--	395	--	--	--
All types								
Sawtimber	1,218,478	--	1,724	5,338	2,222	29,777	38,043	38,877
Poletimber	1,374,391	--	3,197	3,665	14,930	22,669	79,962	65,789
Sapling & seedling	270,823	1,747	13,152	21,097	25,287	49,307	41,785	34,518
Nonstocked	5,173	426	1,332	--	395	--	--	--
All stands	2,868,865	2,173	19,405	30,100	42,834	101,753	159,790	139,184

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	7,440	6,621	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	7,440	6,621	--	--	--	--
Oak-hickory							
Sawtimber	31,080	48,753	32,091	133,240	133,002	19,540	10,116
Poletimber	40,682	61,545	42,304	60,787	106,094	29,815	2,166
Sapling & seedling	3,186	1,388	778	--	--	--	--
All stands	74,948	111,686	75,173	194,027	239,096	49,355	12,282
Elm-ash-soft maple							
Sawtimber	10,324	10,319	24,685	18,205	38,608	19,177	--
Poletimber	9,657	13,166	1,615	17,451	7,368	10,072	6,851
Sapling & seedling	3,141	--	--	2,145	--	--	--
All stands	23,122	23,485	26,300	37,801	45,976	29,249	6,851
Maple-birch							
Sawtimber	24,631	48,660	23,445	57,713	101,193	42,323	14,636
Poletimber	13,583	9,541	22,269	32,673	50,038	5,366	10,360
Sapling & seedling	8,281	8,266	3,005	8,663	2,766	--	--
All stands	46,495	66,467	48,719	99,049	153,997	47,689	24,996
Aspen							
Sawtimber	7,971	9,786	9,868	33,210	11,080	16,361	--
Poletimber	32,820	49,098	18,476	92,799	53,745	22,090	7,038
Sapling & seedling	3,935	5,367	--	2,501	--	--	--
All stands	44,726	64,251	28,344	128,510	64,825	38,451	7,038
Paper birch							
Sawtimber	1,850	4,197	--	--	3,569	--	--
Poletimber	12,868	4,783	3,817	2,378	21,477	5,559	--
Sapling & seedling	--	3,294	--	2,054	--	--	--
All stands	14,718	12,274	3,817	4,432	25,046	5,559	--
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	556	--	--	--	--	--	--
All stands	556	--	--	--	--	--	--
Nonstocked	--	--	2,106	--	914	--	--
All types							
Sawtimber	90,860	143,017	104,149	296,110	334,057	109,552	24,752
Poletimber	128,102	178,968	111,114	250,594	278,489	109,427	127,485
Sapling & seedling	38,802	19,846	3,783	18,733	2,766	--	--
Nonstocked	--	--	2,106	--	914	--	--
All stands	257,764	341,831	221,152	565,437	616,226	218,979	152,237

Table 37.--Net volume of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Central Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	108,506	--	--	--	2,460	--	14,224	6,829
Poletimber	144,537	--	--	--	--	2,193	9,015	9,640
Sapling & seedling	23,496	--	1,677	--	--	4,324	368	10,194
All stands	276,539	--	1,677	--	2,460	6,517	23,607	26,663
Red pine								
Sawtimber	159,013	--	--	--	--	--	--	--
Poletimber	73,412	--	--	--	--	--	--	5,614
Sapling & seedling	17,231	790	--	--	1,282	--	--	--
All stands	249,656	790	--	--	1,282	--	--	5,614
White pine								
Sawtimber	422,103	--	3,600	--	--	--	7,384	--
Poletimber	15,162	--	--	--	--	--	2,120	--
Sapling & seedling	2,520	--	--	--	--	--	2,520	--
All stands	439,785	--	3,600	--	--	--	12,024	--
Balsam fir								
Sawtimber	3,173	--	--	--	--	3,173	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	17,966	--	--	855	--	10,797	--	850
All stands	21,139	--	--	855	--	13,970	--	850
White spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Black spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Northern white-cedar								
Sawtimber	5,678	--	--	--	--	--	--	--
Poletimber	37,830	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	43,508	--	--	--	--	--	--	--

(Table 37 continued on next page)

[1/] International 1/4-inch rule.

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	9,029	14,407	12,072	31,410	18,075	--	--
Poletimber	23,678	42,345	21,095	27,587	4,749	--	4,235
Sapling & seedling	6,933	--	--	--	--	--	--
All stands	39,640	56,752	33,167	58,997	22,824	--	4,235
Red pine							
Sawtimber	10,897	32,416	10,387	38,079	44,944	22,290	--
Poletimber	--	--	--	7,411	16,371	3,754	40,262
Sapling & seedling	4,017	4,016	--	7,126	--	--	--
All stands	14,914	36,432	10,387	52,616	61,315	26,044	40,262
White pine							
Sawtimber	40,761	37,068	24,797	166,133	122,862	19,498	--
Poletimber	--	1,772	--	1,814	--	9,456	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	40,761	38,840	24,797	167,947	122,862	28,954	--
Balsam fir							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	5,464	--	--	--	--	--	--
All stands	5,464	--	--	--	--	--	--
White spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Northern white-cedar							
Sawtimber	5,678	--	--	--	--	--	--
Poletimber	--	--	--	2,218	2,310	10,944	22,358
Sapling & seedling	--	--	--	--	--	--	--
All stands	5,678	--	--	2,218	2,310	10,944	22,358

(Table 37 continued on next page)

(Table 37 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	4,318	--	--	4,318	--	--	--	--
Poletimber	11,026	--	--	--	--	--	--	--
Sapling & seedling	4,687	766	--	--	--	3,921	--	--
All stands	20,031	766	--	4,318	--	3,921	--	--
Oak-hickory								
Sawtimber	1,624,490	--	--	6,265	3,016	49,526	75,274	75,328
Poletimber	547,769	--	--	--	4,423	1,321	46,669	24,440
Sapling & seedling	106,746	--	2,437	19,362	10,643	16,555	20,601	25,350
All stands	2,279,005	--	2,437	25,627	18,082	67,402	142,544	125,118
Elm-ash-soft maple								
Sawtimber	455,605	--	1,422	5,868	--	19,261	6,022	20,483
Poletimber	126,268	--	--	1,657	7,498	1,700	14,630	10,551
Sapling & seedling	36,939	547	1,686	3,220	3,766	1,604	12,094	2,751
All stands	618,812	547	3,108	10,745	11,264	22,565	32,746	33,785
Maple-birch								
Sawtimber	1,156,430	--	--	7,778	--	27,924	29,011	9,913
Poletimber	271,922	--	--	2,183	4,731	2,081	15,137	19,077
Sapling & seedling	131,995	1,381	2,178	7,479	11,777	19,661	10,154	4,433
All stands	1,560,347	1,381	2,178	17,440	16,508	49,666	54,302	33,423
Aspen								
Sawtimber	267,209	--	2,559	--	1,997	11,236	9,320	9,471
Poletimber	286,712	--	--	695	1,397	8,863	22,333	27,997
Sapling & seedling	69,727	1,091	16,970	878	5,729	15,775	9,403	11,904
All stands	623,648	1,091	19,529	1,573	9,123	35,874	41,056	49,372
Paper birch								
Sawtimber	52,783	--	--	--	--	--	--	23,043
Poletimber	77,483	--	--	--	--	1,908	1,474	--
Sapling & seedling	23,925	--	2,597	851	1,705	5,530	6,979	--
All stands	154,191	--	2,597	851	1,705	7,438	8,453	23,043
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Nonstocked	9,075	2,340	2,191	--	1,863	--	--	--
All types								
Sawtimber	4,259,308	--	7,581	24,229	7,473	111,120	141,235	145,067
Poletimber	1,592,121	--	--	4,535	18,049	18,066	111,378	97,319
Sapling & seedling	435,232	4,575	27,545	32,645	34,902	78,167	62,119	55,482
Nonstocked	9,075	2,340	2,191	--	1,863	--	--	--
All stands	6,295,736	6,915	37,317	61,409	62,287	207,353	314,732	297,868

(Table 37 continued on next page)

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	6,123	4,903	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	6,123	4,903	--	--	--	--
Oak-hickory							
Sawtimber	105,029	173,870	117,689	476,115	452,297	62,415	27,666
Poletimber	41,926	87,218	64,067	92,750	153,371	30,489	1,095
Sapling & seedling	2,231	5,491	4,076	--	--	--	--
All stands	149,186	266,579	185,832	568,865	605,668	92,904	28,761
Elm-ash-soft maple							
Sawtimber	42,306	34,147	80,242	53,500	139,974	52,380	--
Poletimber	15,926	19,024	845	26,024	13,357	4,789	10,267
Sapling & seedling	2,283	--	--	8,988	--	--	--
All stands	60,515	53,171	81,087	88,512	153,331	57,169	10,267
Maple-birch							
Sawtimber	88,852	186,657	76,894	193,944	346,741	138,999	49,717
Poletimber	26,442	24,388	27,319	46,111	84,753	3,608	16,092
Sapling & seedling	7,024	26,768	6,699	27,933	6,508	--	--
All stands	122,318	237,813	110,912	267,988	438,002	142,607	65,809
Aspen							
Sawtimber	23,632	28,826	23,025	96,314	27,268	33,561	--
Poletimber	27,652	58,117	12,942	62,442	48,773	10,653	4,848
Sapling & seedling	--	6,731	--	1,246	--	--	--
All stands	51,284	93,674	35,967	160,002	76,041	44,214	4,848
Paper birch							
Sawtimber	5,150	11,190	--	--	13,400	--	--
Poletimber	16,530	11,484	1,172	3,912	34,930	6,073	--
Sapling & seedling	--	6,263	--	--	--	--	--
All stands	21,680	28,937	1,172	3,912	48,330	6,073	--
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	--	--	2,681	--	--	--	--
All types							
Sawtimber	331,334	518,581	345,106	1,055,495	1,165,561	329,143	77,383
Poletimber	152,154	250,471	132,343	270,269	358,614	79,766	99,157
Sapling & seedling	27,952	49,269	10,775	45,293	6,508	--	--
Nonstocked	--	--	2,681	--	--	--	--
All stands	511,440	818,321	490,905	1,371,057	1,530,683	408,909	176,540

Table 38.--Net volume of sawtimber on commercial forest land by species group and butt log grade, Central Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All grades	Log grade 1	2	3	Tie and timber
Softwoods					
Jack pine	416,129	10,013	31,227	374,889	--
Red pine	325,587	69,624	21,801	234,162	--
White pine	772,302	43,123	150,740	407,436	171,003
White spruce	3,147	--	--	3,147	--
Black spruce	3,038	--	--	3,038	--
Balsam fir	18,838	--	--	18,838	--
Hemlock	88,210	--	--	88,210	--
Tamarack	34,873	--	--	34,873	--
Eastern redcedar	1,272	--	--	1,272	--
Northern white-cedar	40,436	--	--	40,436	--
Other softwoods	6,238	--	--	6,238	--
Total	1,710,070	122,760	203,768	1,212,539	171,003
Hardwoods					
White oak	472,657	17,146	99,478	281,788	74,245
Select red oak	1,106,582	228,337	382,697	455,855	39,693
Other red oak	772,840	25,997	87,439	431,183	228,221
Select hickory	13,982	--	--	13,982	--
Other hickory	19,733	--	--	19,733	--
Basswood	213,198	42,647	29,665	140,886	--
Beech	4,749	--	--	4,749	--
Yellow birch	54,922	--	11,540	37,510	5,874
Hard maple	341,476	45,170	122,460	148,122	25,724
Soft maple	563,439	50,270	127,922	374,289	10,958
Elm	109,512	--	49,306	28,138	32,068
Black ash	100,226	25,210	48,126	26,890	--
White & green ash	96,736	48,662	21,278	20,637	6,161
Cottonwood	10,173	--	--	10,173	--
Willow	10,825	--	8,623	2,202	--
Hackberry	--	--	--	--	--
Balsam poplar	--	--	--	--	--
Bigtooth aspen	266,184	17,801	103,607	140,464	4,310
Quaking aspen	328,348	--	61,978	241,880	24,488
Paper birch	55,304	--	--	55,304	--
River birch	5,566	--	--	5,566	--
Black cherry	10,963	--	--	10,963	--
Black walnut	1,275	--	--	1,275	--
Butternut	21,233	--	21,233	--	--
Other hardwoods	5,743	--	--	5,743	--
Total	4,585,666	501,240	1,175,352	2,457,332	451,742
All species	6,295,736	624,000	1,379,120	3,669,871	622,745

Table 39.--Net volume of short-log trees on commercial forest land by species group and diameter class, Central Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	1,961	1,038	719	204	--	--	--	--	--	--	--
Red pine	137	137	--	--	--	--	--	--	--	--	--
White pine	6,945	2,077	1,027	226	377	808	353	906	852	319	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	641	--	316	179	--	--	146	--	--	--	--
Tamarack	191	--	--	191	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	415	130	285	--	--	--	--	--	--	--	--
Other softwoods	364	364	--	--	--	--	--	--	--	--	--
Total	10,654	3,746	2,347	800	377	808	499	906	852	319	--
Hardwoods											
White oak	13,077	--	1,912	3,050	2,060	2,571	1,268	350	1,300	--	566
Select red oak	14,390	--	563	3,766	2,265	2,004	1,845	1,531	1,743	673	--
Other red oak	32,019	--	4,708	8,746	7,866	5,547	1,835	1,544	1,773	--	--
Select hickory	429	--	247	--	182	--	--	--	--	--	--
Other hickory	402	--	151	251	--	--	--	--	--	--	--
Basswood	1,704	--	--	512	238	259	252	237	--	206	--
Beech	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	1,527	--	317	802	202	206	--	--	--	--	--
Hard maple	6,855	--	349	1,080	1,599	1,306	911	668	715	227	--
Soft maple	12,678	--	1,216	1,814	2,446	1,213	1,451	1,586	1,343	1,033	576
Elm	1,822	--	--	280	659	--	--	448	211	224	--
Black ash	542	--	--	--	542	--	--	--	--	--	--
White & green ash	954	--	234	227	254	239	--	--	--	--	--
Cottonwood	188	--	--	--	--	--	188	--	--	--	--
Willow	214	--	--	--	--	--	--	--	214	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	1,187	--	205	256	505	--	221	--	--	--	--
Quaking aspen	1,408	--	721	464	223	--	--	--	--	--	--
Paper birch	798	--	173	441	184	--	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	357	--	146	--	211	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	768	--	398	199	171	--	--	--	--	--	--
Other hardwoods	458	--	236	97	125	--	--	--	--	--	--
Total	91,777	--	11,576	21,985	19,732	13,345	7,971	6,364	7,299	2,363	1,142
All species	102,431	3,746	13,923	22,785	20,109	14,153	8,470	7,270	8,151	2,682	1,142

Table 40.--Net volume of short-log trees on commercial forest land by species group and diameter class, Central Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 5.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	6,797	3,599	2,493	705	--	--	--	--	--	--	--
Red pine	572	572	--	--	--	--	--	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	22,856	5,440	3,040	754	1,330	2,931	1,315	3,433	3,312	1,301	--
Tamarack	1,569	--	733	444	--	--	392	--	--	--	--
Eastern redcedar	835	--	--	835	--	--	--	--	--	--	--
Northern white-cedar	1,410	423	987	--	--	--	--	--	--	--	--
Other softwoods	1,820	1,820	--	--	--	--	--	--	--	--	--
Total	35,859	11,854	7,253	2,738	1,330	2,931	1,707	3,433	3,312	1,301	--
Hardwoods											
White oak	34,629	--	5,495	8,295	5,374	6,615	3,205	876	3,309	--	1,460
Select red oak	32,384	--	1,246	8,331	5,104	4,461	4,132	3,480	4,031	1,599	--
Other red oak	73,144	--	10,734	19,910	17,854	12,652	4,256	3,583	4,155	--	--
Select hickory	1,247	--	769	--	478	--	--	--	--	--	--
Other hickory	1,086	--	435	651	--	--	--	--	--	--	--
Basswood	3,705	--	--	1,104	513	557	543	520	--	468	--
Beech	3,408	--	652	1,774	470	512	--	--	--	--	--
Yellow birch	16,819	--	840	2,541	3,839	3,205	2,268	1,689	1,837	600	--
Hard maple	33,390	--	3,646	5,003	6,491	3,102	3,712	4,007	3,401	2,573	1,455
Soft maple	4,664	--	--	662	1,650	--	--	1,173	561	618	--
Elm	1,386	--	--	--	1,386	--	--	--	--	--	--
Black ash	2,237	--	582	556	565	534	--	--	--	--	--
White & green ash	574	--	--	--	--	--	574	--	--	--	--
Cottonwood	692	--	--	--	--	--	--	--	692	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	1,935	--	320	402	833	--	380	--	--	--	--
Quaking aspen	3,150	--	1,533	1,078	539	--	--	--	--	--	--
Paper birch	2,209	--	481	1,202	526	--	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	1,036	--	454	--	582	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--
Butternut	2,108	--	1,118	543	447	--	--	--	--	--	--
Other hardwoods	1,631	--	825	363	443	--	--	--	--	--	--
Total	221,434	--	29,130	52,415	47,094	31,638	19,070	15,328	17,986	5,858	2,915
All species	257,293	11,854	36,383	55,153	48,424	34,569	20,777	18,761	21,298	7,159	2,915

[1/] International 1/4-inch rule.

Table 41.--Net annual growth of growing stock on commercial forest land by softwoods and hardwoods, Central Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967[1/]	1982
Softwoods	21,400	32,720
Hardwoods	50,600	67,456
All species	72,000	100,176

[1/] Figures have been adjusted from those published after the 1968 survey to conform to 1982 volumes because of changes in survey procedures.

Table 42.--Net annual growth of growing stock on commercial forest land by species group and county, Central Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County												
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette	Monroe	Portage	Waupaca	Waushara	Wood
Softwoods														
Jack pine	8,124	1,241	86	256	310	2,380	2,193	11	93	529	216	--	386	423
Red pine	15,411	2,790	104	395	1,463	2,130	1,307	509	885	217	1,802	1,320	2,445	44
White pine	6,226	546	266	351	218	750	379	554	465	436	489	582	685	505
White spruce	37	--	6	--	--	--	--	14	--	--	--	7	--	10
Black spruce	305	--	86	117	--	--	--	40	--	--	22	19	--	21
Balsam fir	773	--	-7	--	--	--	--	401	--	--	60	319	--	--
Hemlock	375	--	2	--	--	--	--	213	--	--	55	100	--	5
Tamarack	240	9	26	--	--	47	-3	8	63	-41	21	118	-8	--
Eastern redcedar	21	--	--	--	--	8	6	--	7	--	--	--	--	--
Northern white-cedar	1,068	--	--	--	--	--	--	195	--	--	414	383	76	--
Other softwoods	140	--	--	--	--	20	--	--	58	--	--	--	62	--
Total	32,720	4,586	569	1,119	1,991	5,335	3,882	1,945	1,571	1,141	3,079	2,848	3,646	1,008
Hardwoods														
White oak	2,950	98	243	592	205	426	204	44	229	169	164	122	260	194
Select red oak	8,337	214	562	1,257	358	1,563	633	976	98	1,279	295	487	129	486
Other red oak	10,830	1,686	156	214	1,215	2,027	1,676	13	294	1,091	644	389	995	430
Select hickory	113	--	--	--	--	17	4	--	8	45	--	2	37	--
Other hickory	285	--	97	15	--	--	7	53	--	7	34	72	--	--
Basswood	2,344	25	428	395	102	106	-1	837	31	35	132	130	6	118
Beech	7	--	--	--	--	--	--	--	--	--	--	7	--	--
Yellow birch	454	--	37	17	--	--	--	321	--	--	8	42	--	29
Hard maple	3,318	--	598	241	29	--	47	1,813	--	72	151	267	--	100
Soft maple	12,334	218	1,125	2,324	710	1,483	605	2,040	81	562	485	1,094	215	1,392
Elm	-1,059	-8	-60	-135	-77	51	-19	-411	-36	-46	-28	-272	28	-46
Black ash	2,080	18	527	394	19	--	8	389	25	75	209	311	28	77
White & green ash	1,837	--	240	217	8	8	16	544	222	193	29	250	72	38
Cottonwood	38	1	--	--	--	10	--	--	4	13	--	--	10	--
Willow	17	38	--	--	--	-24	14	--	12	--	--	-23	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	-4	--	--	--	--	--	--	--	--	--	--	--	--	-4
Bigtooth aspen	4,296	102	614	789	169	702	198	653	--	282	124	165	216	282
Quaking aspen	13,046	486	1,232	2,759	939	990	1,098	1,767	109	178	698	304	-16	2,502
Paper birch	5,352	42	681	529	373	473	235	1,526	14	667	105	389	164	154
River birch	-12	--	--	--	31	21	-80	--	--	--	--	--	--	16
Black cherry	581	19	15	66	66	72	28	47	3	74	101	52	29	9
Black walnut	6	--	--	--	--	--	6	--	--	--	--	--	--	--
Butternut	86	--	6	17	--	--	21	10	--	-5	--	31	6	--
Other hardwoods	220	--	--	--	--	8	--	--	4	--	--	64	144	--
Total	67,456	2,939	6,501	9,691	4,147	7,933	4,700	10,622	1,098	4,691	3,151	3,883	2,323	5,777
All species	100,176	7,525	7,070	10,810	6,138	13,268	8,582	12,567	2,669	5,832	6,230	6,731	5,969	6,785

Table 43.--Net annual growth of sawtimber on commercial forest land by species group and county, Central Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County												
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette	Monroe	Portage	Waupaca	Waushara	Wood
Softwoods														
Jack pine	23,196	4,201	38	644	1,131	5,316	4,809	102	977	2,001	262	--	1,090	2,625
Red pine	27,575	3,124	737	2,627	595	3,078	4,525	503	--	183	2,058	7,163	2,730	252
White pine	29,065	1,901	1,399	2,073	1,618	3,078	1,354	2,435	1,991	2,532	2,197	2,946	2,957	2,584
White spruce	157	--	86	--	--	--	--	71	--	--	--	--	--	--
Black spruce	148	--	--	--	--	--	--	30	--	--	--	118	--	--
Balsam fir	1,129	--	--	--	--	--	--	630	--	--	--	499	--	--
Hemlock	1,289	--	--	--	--	--	--	770	--	--	18	477	--	24
Tamarack	874	52	--	--	--	--	--	19	279	--	84	268	172	--
Eastern redcedar	85	--	--	--	--	85	--	--	--	--	--	--	--	--
Northern white-cedar	1,476	--	--	--	--	--	--	401	--	--	374	655	46	--
Other softwoods	314	--	--	--	--	197	--	--	59	--	--	--	58	--
Total	85,308	9,278	2,260	5,344	3,344	11,754	10,688	4,961	3,306	4,716	4,993	12,126	7,053	5,485
Hardwoods														
White oak	13,744	359	935	2,122	1,568	1,206	2,117	151	1,205	813	584	480	698	1,506
Select red oak	38,379	570	3,065	4,262	1,688	6,430	3,999	3,281	401	6,616	1,547	2,826	472	3,222
Other red oak	36,212	6,983	1,006	260	2,710	7,520	3,993	115	1,370	2,855	2,110	1,748	3,648	1,894
Select hickory	251	--	--	--	--	114	13	--	24	72	--	9	19	--
Other hickory	820	--	213	98	--	--	--	297	--	14	125	73	--	--
Basswood	7,683	79	2,445	1,286	241	--	46	1,739	200	68	176	983	27	393
Beech	1,198	--	--	--	--	--	--	--	--	--	--	1,198	--	--
Yellow birch	1,981	--	46	--	--	--	--	1,547	--	--	--	172	--	216
Hard maple	11,491	--	772	790	-54	--	292	6,840	--	137	98	2,438	--	178
Soft maple	21,042	290	2,537	1,977	564	1,921	1,432	4,683	304	1,000	1,267	2,720	781	1,566
Elm	-2,676	-38	-220	-502	-318	579	654	-1,133	-90	-340	-352	-809	-7	-100
Black ash	5,536	124	1,664	499	--	--	176	43	192	687	625	1,101	93	332
White & green ash	4,896	--	437	110	--	33	107	841	95	67	288	1,704	43	1,171
Cottonwood	140	6	--	--	--	49	3	--	18	19	--	--	45	--
Willow	-26	103	--	--	--	-96	--	--	53	--	--	-86	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	12,694	213	2,137	2,211	974	1,534	676	1,580	--	786	1,040	597	640	306
Quaking aspen	22,119	501	2,759	6,104	1,669	1,326	934	4,721	833	648	694	93	9	1,828
Paper birch	3,406	--	537	285	16	88	94	171	--	377	1,171	264	187	216
River birch	17	--	--	--	119	57	-161	--	--	--	--	--	--	2
Black cherry	379	34	--	--	--	--	19	227	--	3	96	--	--	--
Black walnut	25	--	--	--	--	--	25	--	--	--	--	--	--	--
Butternut	1,682	--	26	164	--	--	13	16	--	102	--	305	1,056	--
Other hardwoods	884	--	--	--	--	--	--	--	--	--	--	884	--	--
Total	181,877	9,224	18,359	19,666	9,177	20,761	14,432	25,119	4,605	13,924	9,469	16,700	7,711	12,730
All species	267,185	18,502	20,619	25,010	12,521	32,515	25,120	30,080	7,911	18,640	14,462	28,826	14,764	18,215

[1/] International 1/4-inch rule.

Table 44.--Net annual growth of growing stock on commercial forest land by ownership class and softwoods and hardwoods, Central Unit, Wisconsin, 1982

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	- - - - Thousand cubic feet - - - -			- - - Thousand board feet[1/] - - -		
National Forest	--	--	--	--	--	--
Miscellaneous federal	3,644	1,469	2,175	9,089	5,345	3,744
State	3,102	1,413	1,689	7,062	4,206	2,856
County and municipal	13,079	3,010	10,069	26,417	9,148	17,269
Indian	241	96	145	541	541	--
Forest industry	5,095	2,266	2,829	12,444	2,676	9,768
Farmer	31,332	7,127	24,205	95,035	22,363	72,672
Misc. private-corp.	4,342	2,176	2,166	9,614	3,118	6,496
Misc. private-indiv.	39,341	15,163	24,178	106,983	37,911	69,072
All owners	100,176	32,720	67,456	267,185	85,308	181,877

[1/] International 1/4-inch rule.

Table 45.--Net annual growth of growing stock on commercial forest land by species group and forest type, Central Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All types	Forest type							
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack
Softwoods									
Jack pine	8,124	5,511	206	230	--	--	--	--	--
Red pine	15,411	763	13,240	584	26	--	--	--	--
White pine	6,226	110	426	2,813	84	--	--	14	49
White spruce	37	--	7	--	--	10	--	--	--
Black spruce	305	--	19	--	--	--	142	13	--
Balsam fir	773	--	--	--	231	--	--	153	--
Hemlock	375	--	--	--	--	--	--	-5	--
Tamarack	240	--	--	15	--	--	2	-12	334
Eastern redcedar	21	8	--	--	--	--	--	--	--
Northern white-cedar	1,068	--	--	--	--	--	--	762	13
Other softwoods	140	--	82	--	--	--	--	--	--
Total	32,720	6,392	13,980	3,642	341	10	144	925	396
Hardwoods									
White oak	2,950	8	10	43	--	--	--	--	--
Select red oak	8,337	15	11	20	6	--	--	2	--
Other red oak	10,830	461	121	194	--	--	--	2	--
Select hickory	113	--	--	22	--	--	--	--	--
Other hickory	285	--	--	--	--	--	--	--	--
Basswood	2,344	--	2	--	4	--	--	3	--
Beech	7	--	-3	--	--	--	--	--	--
Yellow birch	454	--	--	-11	--	--	--	-2	5
Hard maple	3,318	--	8	23	--	--	--	--	--
Soft maple	12,334	--	1	251	8	--	--	-2	24
Elm	-1,059	--	--	-23	8	--	--	-17	5
Black ash	2,080	--	--	14	13	--	--	9	--
White & green ash	1,837	--	9	--	--	--	--	--	--
Cottonwood	38	9	--	--	--	--	--	--	--
Willow	17	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--
Balsam poplar	-4	--	--	--	--	--	--	--	--
Bigtooth aspen	4,296	38	-8	125	--	--	--	--	14
Quaking aspen	13,046	95	2	743	--	--	--	-47	194
Paper birch	5,352	12	--	47	18	--	--	12	18
River birch	-12	--	--	--	--	--	--	--	--
Black cherry	581	--	--	66	--	--	--	--	--
Black walnut	6	--	--	--	--	--	--	--	--
Butternut	86	--	--	--	--	--	--	--	--
Other hardwoods	220	--	--	--	--	--	--	--	--
Total	67,456	638	153	1,514	57	--	--	-40	260
All species	100,176	7,030	14,133	5,156	398	10	144	885	656

(Table 45 continued on next page)

(Table 45 continued)

Species group	Forest type						
	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods							
Jack pine	1,378	-2	210	534	53	--	4
Red pine	219	13	410	72	84	--	--
White pine	975	379	1,003	193	180	--	--
White spruce	--	14	6	--	--	--	--
Black spruce	--	19	5	107	--	--	--
Balsam fir	26	69	257	25	12	--	--
Hemlock	5	55	308	12	--	--	--
Tamarack	--	-115	--	11	-12	--	17
Eastern redcedar	13	--	--	--	--	--	--
Northern white-cedar	9	107	123	--	54	--	--
Other softwoods	20	--	--	--	--	38	--
Total	2,645	539	2,322	954	371	38	21
Hardwoods							
White oak	2,056	155	332	215	123	--	8
Select red oak	6,002	165	1,256	727	129	--	4
Other red oak	8,573	166	439	792	27	--	55
Select hickory	71	2	--	--	18	--	--
Other hickory	94	--	130	61	--	--	--
Basswood	209	517	1,491	84	17	--	17
Beech	--	--	10	--	--	--	--
Yellow birch	16	71	373	-4	6	--	--
Hard maple	250	18	2,703	267	49	--	--
Soft maple	1,916	3,593	3,415	2,916	212	--	--
Elm	-54	-597	-334	-57	49	--	-39
Black ash	38	1,436	185	314	52	--	19
White & green ash	350	255	1,142	60	21	--	--
Cottonwood	19	--	1	5	4	--	--
Willow	--	-60	12	52	13	--	--
Hackberry	--	--	--	--	--	--	--
Balsam poplar	--	--	--	-4	--	--	--
Bigtooth aspen	1,061	2	558	2,347	159	--	--
Quaking aspen	822	544	890	8,883	918	--	2
Paper birch	1,075	213	745	1,279	1,919	--	14
River birch	-2	-10	--	--	--	--	--
Black cherry	239	47	154	56	19	--	--
Black walnut	--	--	6	--	--	--	--
Butternut	44	--	25	7	10	--	--
Other hardwoods	13	64	4	139	--	--	--
Total	22,792	6,581	13,537	18,139	3,745	--	80
All species	25,437	7,120	15,859	19,093	4,116	38	101

Table 46.--Net annual growth of sawtimber on commercial forest land by species group and forest type, Central Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All types	Forest type							
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack
Softwoods									
Jack pine	23,196	13,990	652	364	--	--	--	--	--
Red pine	27,575	1,002	23,223	1,211	148	--	--	--	--
White pine	29,065	749	775	12,967	492	--	--	34	229
White spruce	157	--	--	--	--	--	--	--	--
Black spruce	148	--	--	--	--	--	--	--	--
Balsam fir	1,129	--	--	--	291	--	--	152	--
Hemlock	1,289	--	--	--	--	--	--	-18	--
Tamarack	874	--	--	140	--	--	--	-2	562
Eastern redcedar	85	85	--	--	--	--	--	--	--
Northern white-cedar	1,476	--	--	--	--	--	--	859	--
Other softwoods	314	--	314	--	--	--	--	--	--
Total	85,308	15,826	24,964	14,682	931	--	--	1,025	791
Hardwoods									
White oak	13,744	--	96	115	--	--	--	--	--
Select red oak	38,379	173	-16	72	28	--	--	12	--
Other red oak	36,212	649	364	536	--	--	--	10	--
Select hickory	251	--	--	--	--	--	--	--	--
Other hickory	820	--	--	--	--	--	--	--	--
Basswood	7,683	--	12	--	23	--	--	15	--
Beech	1,198	--	1,079	--	--	--	--	--	--
Yellow birch	1,981	--	--	-80	--	--	--	--	--
Hard maple	11,491	--	890	156	--	--	--	--	--
Soft maple	21,042	--	1	147	--	--	--	9	11
Elm	-2,676	--	--	-68	--	--	--	-49	--
Black ash	5,536	--	--	149	93	--	--	71	--
White & green ash	4,896	--	37	--	--	--	--	--	--
Cottonwood	140	--	--	--	--	--	--	--	--
Willow	-26	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--
Bigtooth aspen	12,694	53	--	-43	--	--	--	--	33
Quaking aspen	22,119	--	--	18	--	--	--	-15	--
Paper birch	3,406	--	--	-58	--	--	--	5	--
River birch	17	--	--	--	--	--	--	--	--
Black cherry	379	--	--	--	--	--	--	--	--
Black walnut	25	--	--	--	--	--	--	--	--
Butternut	1,682	--	--	--	--	--	--	--	--
Other hardwoods	884	--	--	--	--	--	--	--	--
Total	181,877	875	2,463	944	144	--	--	58	44
All species	267,185	16,701	27,427	15,626	1,075	--	--	1,083	835

(Table 46 continued on next page)

[1/] International 1/4-inch rule.

(Table 46 continued)

Species group	Forest type						
	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods							
Jack pine	4,714	44	425	2,896	111	--	--
Red pine	716	74	348	226	627	--	--
White pine	5,050	1,741	5,086	867	1,075	--	--
White spruce	--	71	86	--	--	--	--
Black spruce	--	118	30	--	--	--	--
Balsam fir	--	219	423	44	--	--	--
Hemlock	24	12	1,208	63	--	--	--
Tamarack	--	11	--	68	-5	--	100
Eastern redcedar	--	--	--	--	--	--	--
Northern white-cedar	--	196	345	--	76	--	--
Other softwoods	--	--	--	--	--	--	--
Total	10,504	2,486	7,951	4,164	1,884	--	100
Hardwoods							
White oak	9,545	591	1,394	556	1,426	--	21
Select red oak	26,837	1,035	6,013	3,466	740	--	19
Other red oak	28,584	747	1,524	3,572	183	--	43
Select hickory	196	9	--	--	46	--	--
Other hickory	170	--	650	--	--	--	--
Basswood	817	748	5,552	415	101	--	--
Beech	--	--	119	--	--	--	--
Yellow birch	65	314	1,614	--	68	--	--
Hard maple	511	49	9,749	37	99	--	--
Soft maple	3,433	7,214	7,375	2,350	502	--	--
Elm	313	-2,283	-600	340	-159	--	-170
Black ash	31	4,134	804	130	124	--	--
White & green ash	1,352	1,602	1,787	--	118	--	--
Cottonwood	88	3	6	24	19	--	--
Willow	--	-238	53	103	56	--	--
Hackberry	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--
Bigtooth aspen	2,881	--	1,355	7,653	762	--	--
Quaking aspen	2,638	2,207	3,346	13,410	515	--	--
Paper birch	336	317	1,055	253	1,498	--	--
River birch	15	2	--	--	--	--	--
Black cherry	148	--	206	--	25	--	--
Black walnut	--	--	25	--	--	--	--
Butternut	1,290	--	392	--	--	--	--
Other hardwoods	--	884	--	--	--	--	--
Total	79,250	17,335	42,419	32,309	6,123	--	-87
All species	89,754	19,821	50,370	36,473	8,007	--	13

Table 47.--Net annual growth of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Central Unit, Wisconsin, 1982

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	829	--	--	--	29	--	189	47	54	65	96	234	115	--	--
Poletimber	4,125	--	--	--	128	95	415	483	521	1,151	564	465	110	--	193
Sapling & seedling	2,076	--	18	151	30	105	161	396	1,215	--	--	--	--	--	--
All stands	7,030	--	18	151	187	200	765	926	1,790	1,216	660	699	225	--	193
Red pine															
Sawtimber	1,600	--	--	--	--	--	--	--	160	361	247	309	296	227	--
Poletimber	12,177	--	--	--	--	--	118	147	453	796	415	2,084	2,404	1,535	4,225
Sapling & seedling	356	4	--	--	7	--	--	--	131	82	--	132	--	--	--
All stands	14,133	4	--	--	7	--	118	147	744	1,239	662	2,525	2,700	1,762	4,225
White pine															
Sawtimber	3,611	--	43	--	--	--	22	--	203	470	402	1,063	1,185	223	--
Poletimber	1,288	--	--	--	--	--	121	--	--	81	--	683	--	403	--
Sapling & seedling	257	--	--	--	--	30	--	--	227	--	--	--	--	--	--
All stands	5,156	--	43	--	--	30	143	--	430	551	402	1,746	1,185	626	--
Balsam fir															
Sawtimber	43	--	--	--	--	43	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	355	--	--	14	--	102	--	94	145	--	--	--	--	--	--
All stands	398	--	--	14	--	145	--	94	145	--	--	--	--	--	--
White spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	10	--	--	--	--	--	--	--	10	--	--	--	--	--	--
All stands	10	--	--	--	--	--	--	--	10	--	--	--	--	--	--
Black spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	144	86	21	--	--	3	-3	--	--	--	--	37	--	--	--
All stands	144	86	21	--	--	3	-3	--	--	--	--	37	--	--	--
Northern white-cedar															
Sawtimber	33	--	--	--	--	--	--	--	33	--	--	--	--	--	--
Poletimber	569	--	--	--	--	--	--	--	--	--	--	47	61	140	321
Sapling & seedling	283	--	--	--	--	--	--	--	--	--	--	283	--	--	--
All stands	885	--	--	--	--	--	--	--	33	--	--	330	61	140	321

(Table 47 continued on next page)

(Table 47 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	27	--	--	27	--	--	--	--	--	--	--	--	--	--	--
Poletimber	527	--	--	--	17	5	--	--	--	319	186	--	--	--	--
Sapling & seedling	102	3	-1	--	--	57	--	43	--	--	--	--	--	--	--
All stands	656	3	-1	27	17	62	--	43	--	319	186	--	--	--	--
Oak-hickory															
Sawtimber	10,428	--	--	-17	31	580	478	457	952	1,192	756	2,836	2,581	367	215
Poletimber	13,113	--	--	--	107	27	1,285	380	1,919	1,930	1,465	1,901	3,054	941	104
Sapling & seedling	1,896	-143	139	325	106	325	464	480	140	41	19	--	--	--	--
All stands	25,437	-143	139	308	244	932	2,227	1,317	3,011	3,163	2,240	4,737	5,635	1,308	319
Elm-ash-soft maple															
Sawtimber	2,519	--	-3	14	--	95	-3	79	138	409	308	300	845	337	--
Poletimber	2,973	--	173	25	155	-58	514	234	312	463	72	529	100	427	27
Sapling & seedling	1,628	11	73	18	180	275	611	242	196	--	--	22	--	--	--
All stands	7,120	11	243	57	335	312	1,122	555	646	872	380	851	945	764	27
Maple-birch															
Sawtimber	7,050	--	--	256	--	252	317	107	344	1,427	414	1,250	1,689	781	213
Poletimber	5,374	--	--	159	171	152	220	431	639	213	482	1,082	1,324	279	222
Sapling & seedling	3,435	17	584	257	251	311	610	191	396	449	263	74	32	--	--
All stands	15,859	17	584	672	422	715	1,147	729	1,379	2,089	1,159	2,406	3,045	1,060	435
Aspen															
Sawtimber	2,538	--	19	--	-13	-24	18	22	268	282	319	922	238	487	--
Poletimber	12,130	--	18	30	65	394	777	813	1,049	1,627	789	3,728	1,865	816	159
Sapling & seedling	4,425	109	220	280	561	1,460	651	777	79	249	--	39	--	--	--
All stands	19,093	109	257	310	613	1,830	1,446	1,612	1,396	2,158	1,108	4,689	2,103	1,303	159
Paper birch															
Sawtimber	636	--	--	--	--	--	--	213	223	124	--	--	76	--	--
Poletimber	1,927	--	--	--	--	105	105	26	386	121	171	65	784	164	--
Sapling & seedling	1,553	20	185	242	113	258	511	--	--	185	--	39	--	--	--
All stands	4,116	20	185	242	113	363	616	239	609	430	171	104	860	164	--
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	38	--	--	--	--	--	--	--	38	--	--	--	--	--	--
All stands	38	--	--	--	--	--	--	--	38	--	--	--	--	--	--
Nonstocked	101	17	49	--	-38	--	--	--	--	--	26	--	47	--	--
All types															
Sawtimber	29,314	--	59	280	47	946	1,021	925	2,375	4,330	2,542	6,914	7,025	2,422	428
Poletimber	54,203	--	191	214	643	720	3,555	2,514	5,279	6,701	4,144	10,584	9,702	4,705	5,251
Sapling & seedling	16,558	107	1,239	1,287	1,248	2,926	3,005	2,223	2,577	1,006	282	626	32	--	--
Nonstocked	101	17	49	--	-38	--	--	--	--	--	26	--	47	--	--
All stands	100,176	124	1,538	1,781	1,900	4,592	7,581	5,662	10,231	12,037	6,994	18,124	16,806	7,127	5,679

Table 48.--Net annual growth of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Central Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	5,357	--	--	--	127	--	1,016	435	425	623	541	1,428	762	--	--
Poletimber	9,856	--	--	--	--	156	1,749	496	911	3,642	1,154	1,224	222	--	302
Sapling & seedling	1,488	--	69	--	--	379	367	371	302	--	--	--	--	--	--
All stands	16,701	--	69	--	127	535	3,132	1,302	1,638	4,265	1,695	2,652	984	--	302
Red pine															
Sawtimber	13,891	--	--	--	--	--	--	--	667	2,036	5,938	1,791	2,148	1,311	--
Poletimber	12,411	--	--	--	--	--	--	600	--	--	--	290	5,041	251	6,229
Sapling & seedling	1,125	21	--	--	85	--	--	--	385	158	--	476	--	--	--
All stands	27,427	21	--	--	85	--	--	600	1,052	2,194	5,938	2,557	7,189	1,562	6,229
White pine															
Sawtimber	14,663	--	240	--	--	--	196	--	1,007	2,295	1,012	4,709	4,469	735	--
Poletimber	1,030	--	--	--	--	--	133	--	--	127	--	103	--	667	--
Sapling & seedling	-67	--	--	--	--	--	-67	--	--	--	--	--	--	--	--
All stands	15,626	--	240	--	--	--	262	--	1,007	2,422	1,012	4,812	4,469	1,402	--
Balsam fir															
Sawtimber	143	--	--	--	--	143	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	932	--	--	23	--	660	--	28	221	--	--	--	--	--	--
All stands	1,075	--	--	23	--	803	--	28	221	--	--	--	--	--	--
White spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar															
Sawtimber	243	--	--	--	--	--	--	--	243	--	--	--	--	--	--
Poletimber	840	--	--	--	--	--	--	--	--	--	--	81	44	173	542
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	1,083	--	--	--	--	--	--	--	243	--	--	81	44	173	542

(Table 48 continued on next page)

[1/] International 1/4-inch rule.

(Table 48 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	130	--	--	130	--	--	--	--	--	--	--	--	--	--	--
Poletimber	465	--	--	--	--	--	--	--	--	135	330	--	--	--	--
Sapling & seedling	240	11	--	--	--	229	--	--	--	--	--	--	--	--	--
All stands	835	11	--	130	--	229	--	--	--	135	330	--	--	--	--
Oak-hickory															
Sawtimber	54,773	--	--	-74	786	2,258	2,337	3,239	5,828	5,519	4,286	16,676	11,843	1,501	574
Poletimber	26,295	--	--	--	261	35	3,334	981	3,078	3,652	2,496	4,239	7,042	1,099	78
Sapling & seedling	8,686	-94	244	1,611	1,700	431	2,882	750	741	315	106	--	--	--	--
All stands	89,754	-94	244	1,537	2,747	2,724	8,553	4,970	9,647	9,486	6,888	20,915	18,885	2,600	652
Elm-ash-soft maple															
Sawtimber	12,624	--	-51	25	--	805	62	402	1,133	1,629	1,136	1,621	3,911	1,951	--
Poletimber	3,802	--	--	32	132	-387	384	248	276	1,470	65	1,049	161	153	219
Sapling & seedling	3,395	6	1,115	33	198	16	186	163	742	--	--	936	--	--	--
All stands	19,821	6	1,064	90	330	434	632	813	2,151	3,099	1,201	3,606	4,072	2,104	219
Maple-birch															
Sawtimber	33,243	--	--	478	--	938	823	286	2,328	6,405	2,511	6,292	8,979	2,900	1,303
Poletimber	11,962	--	--	303	353	90	595	796	1,880	1,551	553	1,568	3,634	50	589
Sapling & seedling	5,165	64	568	470	517	954	568	85	377	551	169	681	161	--	--
All stands	50,370	64	568	1,251	870	1,982	1,986	1,167	4,585	8,507	3,233	8,541	12,774	2,950	1,892
Aspen															
Sawtimber	13,152	--	79	--	563	278	308	370	1,104	1,850	1,223	4,215	1,563	1,599	--
Poletimber	18,069	--	--	29	744	373	823	1,124	1,153	4,350	739	5,427	2,451	628	228
Sapling & seedling	5,252	153	1,154	215	703	1,222	438	978	--	369	--	20	--	--	--
All stands	36,473	153	1,233	244	2,010	1,873	1,569	2,472	2,257	6,569	1,962	9,662	4,014	2,227	228
Paper birch															
Sawtimber	1,918	--	--	--	--	--	--	863	120	244	--	--	691	--	--
Poletimber	5,150	--	--	--	--	75	105	-61	497	1,554	28	813	1,813	326	--
Sapling & seedling	939	131	-43	71	25	111	294	--	--	350	--	--	--	--	--
All stands	8,007	131	-43	71	25	186	399	802	617	2,148	28	813	2,504	326	--
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	13	100	52	--	-130	--	--	--	--	--	-9	--	--	--	--
All types															
Sawtimber	150,137	--	268	559	1,476	4,422	4,742	5,595	12,855	20,601	16,647	36,732	34,366	9,997	1,877
Poletimber	89,880	--	--	364	1,490	342	7,123	4,184	7,795	16,481	5,365	14,794	20,408	3,347	8,187
Sapling & seedling	27,155	292	3,107	2,423	3,228	4,002	4,668	2,375	2,768	1,743	275	2,113	161	--	--
Nonstocked	13	100	52	--	-130	--	--	--	--	--	-9	--	--	--	--
All stands	267,185	392	3,427	3,346	6,064	8,766	16,533	12,154	23,418	38,825	22,278	53,639	54,935	13,344	10,064

Table 49.--Timber removals from growing stock on commercial forest land by species group and county, Central Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County												
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette	Monroe	Portage	Waupaca	Waushara	Wood
Softwoods														
Jack pine	4,740	1,147	86	196	565	792	851	34	86	432	258	--	127	166
Red pine	5,405	1,543	420	146	323	321	448	249	186	154	345	418	749	103
White pine	2,454	156	115	250	232	244	170	135	22	193	253	323	132	229
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	37	--	--	2	--	--	--	31	--	--	--	--	--	4
Balsam fir	41	--	--	--	--	--	--	36	--	--	2	3	--	--
Hemlock	189	--	7	--	--	--	--	122	--	--	15	45	--	--
Tamarack	96	--	39	--	--	--	--	2	2	--	52	1	--	--
Northern white-cedar	29	--	--	--	--	--	--	6	--	--	1	22	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	12,991	2,846	667	594	1,120	1,357	1,469	615	296	779	926	812	1,008	502
Hardwoods														
White oak	3,387	174	491	391	319	299	357	105	110	364	161	343	136	137
Select red oak	7,635	81	1,573	1,031	464	712	479	900	71	869	191	713	68	483
Other red oak	4,381	457	311	127	750	419	705	34	234	436	220	205	329	154
Hickory	111	--	2	1	--	9	3	17	--	27	1	51	--	--
Basswood	1,061	5	161	290	19	8	26	247	2	24	70	130	3	76
Beech	17	--	--	--	--	--	--	--	--	--	--	17	--	--
Yellow birch	307	--	85	53	--	--	--	128	--	--	7	21	--	13
Hard maple	2,371	--	310	497	46	--	78	772	--	106	51	395	--	116
Soft maple	1,845	38	242	219	82	69	95	379	23	59	173	361	31	74
Elm	2,257	29	362	510	54	27	79	653	12	102	34	271	14	110
Ash	1,312	8	327	119	47	15	36	453	7	41	29	158	21	51
Cottonwood	3	1	--	--	--	--	2	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	2,638	11	739	423	58	166	127	477	--	65	107	177	17	271
Quaking aspen	6,750	30	1,092	1,487	323	171	279	1,515	41	39	570	171	4	1,028
Paper birch	937	11	249	187	61	36	52	152	14	36	27	65	3	44
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods[1/]	152	26	45	9	6	26	--	14	--	1	2	17	3	3
Total	35,164	871	5,989	5,344	2,229	1,957	2,318	5,846	514	2,169	1,643	3,095	629	2,560
All species	48,155	3,717	6,656	5,938	3,349	3,314	3,787	6,461	810	2,948	2,569	3,907	1,637	3,062

[1/] Includes black cherry and butternut.

Table 50.--Timber removals from sawtimber on commercial forest land by species group and county, Central Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County												
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette	Monroe	Portage	Waupaca	Waushara	Wood
Softwoods														
Jack pine	6,070	1,333	105	240	691	1,031	1,169	114	107	582	321	--	156	221
Red pine	8,634	1,192	804	402	--	724	897	556	--	473	792	830	1,577	387
White pine	11,064	524	635	1,368	1,220	1,256	573	627	86	1,011	982	1,533	398	851
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	68	--	--	--	--	--	--	63	--	--	--	5	--	--
Hemlock	850	--	--	--	--	--	--	535	--	--	66	249	--	--
Tamarack	90	--	--	--	--	--	--	4	3	--	81	2	--	--
Northern white-cedar	123	--	--	--	--	--	--	27	--	--	4	92	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	26,899	3,049	1,544	2,010	1,911	3,011	2,639	1,926	196	2,066	2,246	2,711	2,131	1,459
Hardwoods														
White oak	13,363	505	2,118	1,476	1,289	1,142	1,282	348	380	1,681	482	1,609	566	485
Select red oak	33,359	374	6,872	4,312	2,362	3,065	1,961	3,435	217	4,378	754	3,510	195	1,924
Other red oak	15,930	1,304	1,447	307	2,582	1,419	2,670	196	872	1,630	926	641	1,385	551
Hickory	420	--	13	8	--	43	21	51	--	127	7	150	--	--
Basswood	4,366	22	688	891	95	--	122	1,191	10	117	326	621	21	262
Beech	80	--	--	--	--	--	--	--	--	--	--	80	--	--
Yellow birch	664	--	131	--	--	--	--	424	--	--	--	67	--	42
Hard maple	9,249	--	932	1,845	186	--	286	3,155	--	482	167	1,780	--	416
Soft maple	6,153	82	778	867	299	154	319	1,325	66	184	208	1,457	151	263
Elm	6,275	66	964	735	193	50	271	2,155	32	373	79	1,032	63	262
Ash	3,879	29	538	441	--	44	121	1,550	30	141	85	612	102	186
Cottonwood	18	5	--	--	--	--	13	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	9,960	28	3,369	1,122	253	672	353	1,543	--	291	547	996	86	700
Quaking aspen	16,082	77	2,062	4,113	824	347	970	3,761	103	38	993	51	8	2,735
Paper birch	1,314	--	371	108	74	56	74	238	--	69	37	197	19	71
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods[2/]	375	59	71	31	24	22	--	55	--	3	10	72	12	16
Total	121,487	2,551	20,354	16,256	8,181	7,014	8,463	19,427	1,710	9,514	4,621	12,875	2,608	7,913
All species	148,386	5,600	21,898	18,266	10,092	10,025	11,102	21,353	1,906	11,580	6,867	15,586	4,739	9,372

[1/] International 1/4-inch rule.

[2/] Includes black cherry and butternut.

Table 51.--Growing-stock average annual removals on commercial forest land by species group and county, Central Unit, Wisconsin, 1967-1983

(In thousand cubic feet per year)

Species group	All counties	County												
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette	Monroe	Portage	Waupaca	Waushara	Wood
Softwoods														
Jack pine	3,049	976	--	229	301	697	450	29	--	329	--	--	--	38
Red pine	1,086	81	68	--	--	--	--	437	292	--	175	--	--	33
White pine	1,514	--	--	--	--	--	--	175	460	--	411	265	106	97
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	63	--	--	--	--	--	--	63	--	--	--	--	--	--
Hemlock	185	--	--	--	--	--	--	185	--	--	--	--	--	--
Tamarack	43	--	43	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	5,940	1,057	111	229	301	697	450	889	752	329	586	265	106	168
Hardwoods														
White oak	949	122	--	417	116	--	--	--	--	29	54	134	--	77
Select red oak	2,108	--	361	375	361	94	--	113	--	383	--	294	--	127
Other red oak	1,270	537	--	--	91	42	354	--	--	--	81	--	64	101
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	44	--	--	--	--	--	--	44	--	--	--	--	--	--
Basswood	1,164	--	449	148	--	--	--	290	--	--	--	--	--	277
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	866	--	36	--	--	--	--	678	--	--	--	51	--	101
Hard maple	1,382	--	95	197	--	--	--	688	--	--	--	284	--	118
Soft maple	1,240	--	142	55	--	29	--	260	--	31	249	341	--	133
Elm	4,274	--	159	832	--	--	--	2,365	--	--	24	506	--	388
Black ash	524	--	372	42	--	--	--	--	33	--	--	--	--	77
White & green ash	576	--	52	--	--	--	--	391	--	--	29	--	--	104
Cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	1,047	53	150	65	81	60	83	136	--	129	--	73	--	217
Quaking aspen	6,799	136	1,808	1,398	229	32	53	1,815	--	--	316	--	--	1,012
Paper birch	969	--	--	137	--	--	--	661	--	--	--	--	--	171
River birch	30	--	--	--	--	30	--	--	--	--	--	--	--	--
Black cherry	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	23,242	848	3,624	3,666	878	287	490	7,441	33	572	753	1,683	64	2,903
All species	29,182	1,905	3,735	3,895	1,179	984	940	8,330	785	901	1,339	1,948	170	3,071

Table 52.--Sawtimber average annual removals on commercial forest land by species group and county, Central Unit, Wisconsin, 1967-1983

(In thousand board feet per year)[1/]

Species group	All counties	County												
		Adams	Chippewa	Clark	Eau Claire	Jackson	Juneau	Marathon	Marquette	Monroe	Portage	Waupaca	Waushara	Wood
Softwoods														
Jack pine	8,392	2,984	--	1,217	578	607	1,235	--	--	1,567	--	--	--	204
Red pine	1,243	--	389	--	--	--	--	315	--	--	352	--	--	187
White pine	7,535	--	--	--	--	--	--	471	2,566	--	1,965	1,462	511	560
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hemlock	878	--	--	--	--	--	--	878	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	18,048	2,984	389	1,217	578	607	1,235	1,664	2,566	1,567	2,317	1,462	511	951
Hardwoods														
White oak	3,972	379	--	2,112	--	--	--	--	--	155	299	657	--	370
Select red oak	8,171	--	1,431	1,522	357	460	--	555	--	1,938	--	1,445	--	463
Other red oak	4,386	1,085	--	--	449	175	1,651	--	--	--	409	--	150	467
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	259	--	--	--	--	--	--	259	--	--	--	--	--	--
Basswood	4,686	--	2,195	--	--	--	--	1,427	--	--	--	--	--	1,064
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	3,398	--	--	--	--	--	--	2,650	--	--	--	248	--	500
Hard maple	4,501	--	--	300	--	--	--	2,442	--	--	--	1,485	--	274
Soft maple	3,974	--	744	--	--	--	--	945	--	168	443	1,242	--	432
Elm	14,456	--	305	1,702	--	--	--	9,285	--	--	--	2,138	--	1,026
Black ash	450	--	--	236	--	--	--	--	--	--	--	--	--	214
White & green ash	2,759	--	--	--	--	--	--	2,030	--	--	164	--	--	565
Cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	3,807	251	704	315	374	--	--	639	--	591	--	331	--	602
Quaking aspen	14,349	495	4,453	2,698	404	--	--	4,699	--	--	680	--	--	920
Paper birch	748	--	--	467	--	--	--	--	--	--	--	--	--	281
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	69,916	2,210	9,832	9,352	1,584	635	1,651	24,931	--	2,852	1,995	7,546	150	7,178
All species	87,964	5,194	10,221	10,569	2,162	1,242	2,886	26,595	2,566	4,419	4,312	9,008	661	8,129

[1/] International 1/4-inch rule.

Table 53.--Timber removals from growing stock and sawtimber on commercial forest land by species group, Central Unit, Wisconsin, 1967 and 1982

Species group	Growing stock		Sawtimber	
	1967	1982	1967	1982
	Thousand cubic feet		Thousand board feet[1/]	
Softwoods				
Jack pine	5,021	4,740	10,507	6,070
Red pine	448	5,405	1,294	8,634
White pine	925	2,454	4,564	11,064
White spruce	8	--	54	--
Black spruce	23	37	51	--
Balsam fir	52	41	137	68
Hemlock	232	189	1,108	850
Tamarack	64	96	108	90
Northern white-cedar	106	29	158	123
Other softwoods	1	--	1	--
Total	6,880	12,991	17,982	26,899
Hardwoods				
White oak	2,426	3,387	6,870	13,363
Select red oak	8,950	7,635	32,179	33,359
Other red oak	3,310	4,381	9,188	15,930
Hickory	288	111	645	420
Basswood	1,304	1,061	5,048	4,366
Beech	15	17	60	80
Yellow birch	371	307	1,178	664
Hard maple	2,510	2,371	9,234	9,249
Soft maple	2,793	1,845	7,251	6,153
Elm	2,772	2,257	9,726	6,275
Ash	1,221	1,312	3,110	3,879
Cottonwood	43	3	243	18
Balsam poplar	3	--	21	--
Bigtooth aspen	1,851	2,638	5,698	9,960
Quaking aspen	5,849	6,750	10,527	16,082
Paper birch	1,125	937	1,522	1,314
Black walnut	9	--	56	--
Other hardwoods[2/]	225	152	1,176	375
Total	35,065	35,164	103,732	121,487
All species	41,945	48,155	121,714	148,386

[1/] International 1/4-inch rule.

[2/] Includes black cherry and butternut.

Table 54.--Timber removals from growing stock and sawtimber on commercial forest land by item and species category, Central Unit, Wisconsin, 1982

Item	Growing stock						Sawtimber					
	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods
	Thousand cubic feet						Thousand board feet[1]					
Roundwood products												
Pulpwood[2]	20,333	9,605	180	5,689	2,653	2,206	37,654	14,264	291	13,266	6,218	3,615
Saw logs	16,095	1,983	160	1,874	8,064	4,014	83,980	10,208	779	9,462	42,969	20,562
Fuelwood	6,180	86	11	615	3,219	2,249	18,004	259	34	1,873	9,600	6,238
Posts	455	374	--	3	52	26	527	352	--	7	114	54
Veneer logs	188	--	--	3	77	108	1,195	--	--	20	499	676
Poles	3	--	1	--	2	--	16	--	3	--	13	--
Other	81	--	--	61	5	15	431	--	--	318	39	74
Total	43,335	12,048	352	8,245	14,072	8,618	141,807	25,083	1,107	24,946	59,452	31,219
Logging residue	2,692	311	10	482	1,255	634	5,768	533	24	437	3,200	1,574
Other removals	2,128	240	30	661	76	1,121	811	152	--	659	--	--
All removals	48,155	12,599	392	9,388	15,403	10,373	148,386	25,768	1,131	26,042	62,652	32,793

[1] International 1/4-inch rule.

[2] Includes particleboard and waferboard bolts.

Table 55.--Annual mortality of growing stock on commercial forest land by softwoods and hardwoods, Central Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967[1]	1982
Softwoods	1,500	2,868
Hardwoods	13,700	21,298
Total	15,200	24,166

[1] Figures have been adjusted from those published after the 1968 survey to conform to 1982 volumes because of changes in survey procedures.

Table 56.--Annual mortality of growing stock on commercial forest land by species group and cause, Central Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	1,590	4	86	228	1	153	31	1,087
Red pine	10	--	--	10	--	--	--	--
White pine	310	12	47	--	--	--	--	251
White spruce	1	--	--	--	--	--	--	1
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	265	13	2	--	1	38	--	211
Hemlock	204	--	5	--	7	41	--	151
Tamarack	427	--	34	--	--	132	--	261
Eastern redcedar	--	--	--	--	--	--	--	--
Northern white-cedar	52	--	--	--	--	--	--	52
Other softwoods	9	--	--	--	1	--	--	8
Total	2,868	29	174	238	10	364	31	2,022
Hardwoods								
White oak	515	--	10	--	4	17	2	482
Select red oak	1,411	--	122	--	--	107	15	1,167
Other red oak	1,466	1	197	--	1	132	1	1,134
Select hickory	1	--	1	--	--	--	--	--
Other hickory	28	--	--	--	--	15	--	13
Basswood	374	--	1	--	--	18	--	355
Beech	13	--	7	--	--	--	--	6
Yellow birch	259	--	3	--	--	--	--	256
Hard maple	330	--	11	--	3	8	16	292
Soft maple	1,047	1	90	45	4	20	7	880
Elm	4,193	200	1,061	--	6	--	--	2,926
Black ash	219	--	--	--	--	27	--	192
White & green ash	95	--	1	--	--	21	--	73
Cottonwood	7	--	--	--	3	--	--	4
Willow	82	--	--	--	--	33	--	49
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	15	--	--	--	--	--	--	15
Bigtooth aspen	2,105	7	258	27	--	37	--	1,776
Quaking aspen	7,945	--	1,412	59	14	560	52	5,848
Paper birch	817	--	190	11	--	12	--	604
River birch	139	--	41	--	--	--	--	98
Black cherry	155	--	91	--	--	13	--	51
Black walnut	--	--	--	--	--	--	--	--
Butternut	59	--	--	--	--	--	--	59
Other hardwoods	23	--	2	--	--	--	--	21
Total	21,298	209	3,498	142	35	1,020	93	16,301
All species	24,166	238	3,672	380	45	1,384	124	18,323

Table 57.--Annual mortality of sawtimber on commercial forest land by species group and cause, Central Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	3,292	5	162	254	--	560	6	2,305
Red pine	--	--	--	--	--	--	--	--
White pine	1,316	11	278	--	--	--	2	1,025
White spruce	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	189	--	3	--	--	--	--	186
Hemlock	665	--	10	--	24	150	--	481
Tamarack	416	--	--	--	--	238	--	178
Eastern redcedar	--	--	--	--	--	--	--	--
Northern white-cedar	36	5	--	--	5	5	--	21
Other softwoods	4	--	--	--	--	--	--	4
Total	5,918	21	453	254	29	953	8	4,200
Hardwoods								
White oak	992	--	23	--	13	23	--	933
Select red oak	3,855	--	463	--	--	491	--	2,901
Other red oak	3,094	--	286	--	--	515	--	2,293
Select hickory	9	--	4	--	--	--	--	5
Other hickory	4	--	--	--	--	--	--	4
Basswood	888	--	--	--	--	86	--	802
Beech	31	--	--	--	--	--	--	31
Yellow birch	439	--	9	--	--	--	--	430
Hard maple	971	--	32	--	4	9	76	850
Soft maple	1,445	--	140	--	10	11	--	1,284
Elm	13,587	510	11,618	--	28	--	--	1,431
Black ash	175	--	--	--	--	--	--	175
White & green ash	163	--	6	--	--	66	--	91
Cottonwood	35	--	--	--	15	--	--	20
Willow	326	--	--	--	--	135	--	191
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--
Bigtooth aspen	2,808	30	278	--	--	159	--	2,341
Quaking aspen	4,480	--	1,202	--	--	250	--	3,028
Paper birch	234	--	2	--	--	--	--	232
River birch	259	--	--	--	--	--	--	259
Black cherry	79	--	--	--	--	61	--	18
Black walnut	--	--	--	--	--	--	--	--
Butternut	245	--	--	--	--	--	--	245
Other hardwoods	14	--	--	--	--	--	--	14
Total	34,133	540	14,063	--	70	1,806	76	17,578
All species	40,051	561	14,516	254	99	2,759	84	21,778

[1/] International 1/4-inch rule.

Table 58.--Annual mortality of growing stock and sawtimber on commercial forest land by county and softwoods and hardwoods, Central Unit, Wisconsin, 1982

County	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			Thousand board feet[1]		
Adams	1,089	350	739	1,966	916	1,050
Chippewa	2,028	117	1,911	3,543	253	3,290
Clark	3,238	66	3,172	4,104	341	3,763
Eau Claire	1,273	87	1,186	1,593	96	1,497
Jackson	2,501	372	2,129	3,520	641	2,879
Juneau	1,991	440	1,551	3,667	901	2,766
Marathon	4,049	315	3,734	7,515	544	6,971
Marquette	316	77	239	768	26	742
Monroe	1,409	248	1,161	3,214	680	2,534
Portage	1,468	156	1,312	2,144	242	1,902
Waupaca	2,163	299	1,864	5,022	601	4,421
Waushara	725	212	513	938	395	543
Wood	1,916	129	1,787	2,057	282	1,775
All counties	24,166	2,868	21,298	40,051	5,918	34,133

[1] International 1/4-inch rule.

Table 59.--Annual mortality of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Central Unit, Wisconsin, 1982

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			Thousand board feet[1]		
National Forest	--	--	--	--	--	--
Miscellaneous federal	644	168	476	928	473	455
State	576	153	423	701	446	255
County and municipal	3,784	299	3,485	2,492	362	2,130
Indian	27	--	27	--	--	--
Forest industry	1,303	125	1,178	1,874	251	1,623
Farmer	8,399	1,010	7,389	17,752	1,697	16,055
Misc. private-corp.	1,020	90	930	1,378	83	1,295
Misc. private-indiv.	8,413	1,023	7,390	14,926	2,606	12,320
All owners	24,166	2,868	21,298	40,051	5,918	34,133

[1] International 1/4-inch rule.

Table 60.--Output of timber products by product, softwoods and hardwoods, and source of material, Central Unit, Wisconsin, 1981

Product	Standard units	Total		Roundwood products				Plant byproducts	
				Growing stock		Non-growing stock			
		No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet
Pulpwood[1]									
Softwoods	Standard[2]	159,290	12,559	124,110	9,785	29,097	2,294	6,083	480
Hardwoods	cords	209,362	16,531	133,610	10,548	28,057	2,215	47,695	3,768
Total		368,652	29,090	257,720	20,333	57,154	4,509	53,778	4,248
Saw logs									
Softwoods	Thousand[3]	13,224	2,253	12,578	2,143	646	110	--	--
Hardwoods	board feet	85,514	14,949	79,811	13,952	5,703	997	--	--
Total		98,738	17,202	92,389	16,095	6,349	1,107	--	--
Veneer logs									
Softwoods	Thousand[3]	--	--	--	--	--	--	--	--
Hardwoods	board feet	1,278	202	1,189	188	89	14	--	--
Total		1,278	202	1,189	188	89	14	--	--
Fuelwood									
Softwoods	Standard[2]	15,532	1,081	1,398	97	8,314	577	5,820	407
Hardwoods	cords	521,803	36,506	86,952	6,083	396,609	27,746	38,242	2,677
Total		537,335	37,587	88,350	6,180	404,923	28,323	44,062	3,084
Posts									
Softwoods	Thousand	412	424	363	374	49	50	--	--
Hardwoods	pieces	132	131	82	81	50	50	--	--
Total		544	555	445	455	99	100	--	--
Poles									
Softwoods	Pieces	100	1	100	1	--	--	--	--
Hardwoods		350	2	350	2	--	--	--	--
Total		450	3	450	3	--	--	--	--
Other[4]									
Softwoods	Thousand	409	409	--	--	--	--	409	409
Hardwoods	cubic feet	1,896	1,896	81	81	--	--	1,815	1,815
Total		2,305	2,305	81	81	--	--	2,224	2,224
All products									
Softwoods	Thousand	--	16,727	--	12,400	--	3,031	--	1,296
Hardwoods	cubic feet	--	70,217	--	30,935	--	31,022	--	8,260
Total		--	86,944	--	43,335	--	34,053	--	9,556

[1] Includes roundwood and plant byproducts used for particleboard and waferboard.

[2] 128 cubic feet; includes wood, bark, and air space.

[3] International 1/4-inch rule.

[4] Other (industrial production) includes cabin logs, charcoal wood, shingle bolts, pilings, etc.

Table 61.--Output of roundwood products by product, softwoods and hardwoods, and source of material, Central Unit, Wisconsin, 1981

(In thousand cubic feet)

Product and species group	All sources	Growing-stock trees			Rough and rotten trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
Industrial products							
Saw logs							
Softwoods	2,253	2,143	2,033	110	--	31	79
Hardwoods	14,949	13,952	12,699	1,253	220	550	227
Subtotal	17,202	16,095	14,732	1,363	220	581	306
Veneer logs and bolts							
Softwoods	--	--	--	--	--	--	--
Hardwoods	202	188	188	--	14	--	--
Subtotal	202	188	188	--	14	--	--
Pulpwood[1/]							
Softwoods	12,079	9,785	4,229	5,556	247	860	1,187
Hardwoods	12,763	10,548	6,084	4,464	1,063	424	728
Subtotal	24,842	20,333	10,313	10,020	1,310	1,284	1,915
Cooperage							
Softwoods	--	--	--	--	--	--	--
Hardwoods	5	5	5	--	--	--	--
Subtotal	5	5	5	--	--	--	--
Piling							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
Poles							
Softwoods	1	1	1	--	--	--	--
Hardwoods	2	2	2	--	--	--	--
Subtotal	3	3	3	--	--	--	--
Posts (Round and split)							
Softwoods	424	374	100	274	6	--	44
Hardwoods	131	81	34	47	25	--	25
Subtotal	555	455	134	321	31	--	69
Other							
Softwoods	--	--	--	--	--	--	--
Hardwoods	76	76	55	21	--	--	--
Subtotal	76	76	55	21	--	--	--
All industrial products							
Softwoods	14,757	12,303	6,363	5,940	253	891	1,310
Hardwoods	28,128	24,852	19,067	5,785	1,322	974	980
Total	42,885	37,155	25,430	11,725	1,575	1,865	2,290
Fuelwood							
Softwoods	674	97	56	41	21	328	228
Hardwoods	33,829	6,083	3,717	2,366	1,201	18,517	8,028
Total	34,503	6,180	3,773	2,407	1,222	18,845	8,256
All products							
Softwoods	15,431	12,400	6,419	5,981	274	1,219	1,538
Hardwoods	61,957	30,935	22,784	8,151	2,523	19,491	9,008
Total	77,388	43,335	29,203	14,132	2,797	20,710	10,546

[1/] Includes particleboard and waferboard bolts.

Table 62.--Timber products from roundwood by species group and product, Central Unit, Wisconsin, 1981

Species group	All products	Pulpwood[1]		Saw logs		Veneer logs	
	Thousand cubic feet	Standard cords[2]	Thousand cubic feet	Thousand board feet[3]	Thousand cubic feet	Thousand board feet[3]	Thousand cubic feet
Softwoods							
Jack pine	6,046	71,121	5,606	167	34	--	--
Red pine	6,309	69,635	5,501	1,974	330	--	--
White pine	2,621	9,487	749	10,053	1,706	--	--
White spruce	--	--	--	--	--	--	--
Black spruce	52	479	34	87	18	--	--
Balsam fir	83	524	40	16	3	--	--
Hemlock	213	1,043	79	790	134	--	--
Tamarack	70	918	70	--	--	--	--
Northern white-cedar	37	--	--	137	28	--	--
Other softwoods	--	--	--	--	--	--	--
Total	15,431	153,207	12,079	13,224	2,253	--	--
Hardwoods							
White oak	6,785	11,725	926	9,815	1,719	8	1
Select red oak	14,976	19,972	1,578	24,455	4,285	328	53
Other red oak	8,591	11,460	905	14,032	2,458	188	30
Hickory	214	53	3	367	63	--	--
Basswood	1,023	682	52	5,174	921	99	17
Beech	36	3	4/	203	36	--	--
Yellow birch	816	2,745	215	497	86	147	21
Hard maple	3,670	7,837	619	7,277	1,214	142	24
Soft maple	3,191	7,150	566	4,941	881	122	20
Elm	6,931	7,847	619	4,481	797	178	27
Ash	2,372	3,441	273	2,547	454	12	1
Cottonwood	3	--	--	24	3	--	--
Balsam poplar	2	--	--	11	2	--	--
Bigtooth aspen	3,025	22,362	1,766	3,056	532	6	1
Quaking aspen	7,742	57,220	4,518	7,820	1,363	15	2
Paper birch	2,113	8,985	709	570	96	33	5
Black walnut	2	--	--	24	2	--	--
Other hardwoods[5]	465	185	14	220	37	--	--
Total	61,957	161,667	12,763	85,514	14,949	1,278	202
All species	77,388	314,874	24,842	98,738	17,202	1,278	202

(Table 62 continued on next page)

1/ Includes particleboard and waferboard bolts.

2/ 128 cubic feet; includes wood, bark, and air space.

3/ International 1/4-inch rule.

4/ Less than 500 cubic feet.

5/ Includes butternut and black cherry.

(Table 62 continued)

Species group	Fuelwood		Posts		Poles		Other products
	Standard cords [2]	Thousand cubic feet	Thousand pieces	Thousand cubic feet	Pieces	Thousand cubic feet	Thousand cubic feet
Softwoods							
Jack pine	5,852	406	--	--	--	--	--
Red pine	787	54	412	424	--	--	--
White pine	2,380	166	--	--	--	--	--
White spruce	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--
Balsam fir	582	40	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--
Northern white-cedar	111	8	--	--	100	1	--
Other softwoods	--	--	--	--	--	--	--
Total	9,712	674	412	424	100	1	--
Hardwoods							
White oak	57,983	4,058	77	75	150	1	5
Select red oak	129,366	9,053	5	6	127	1	--
Other red oak	74,231	5,195	3	3	73	[4]	--
Hickory	2,137	148	--	--	--	--	--
Basswood	475	33	--	--	--	--	--
Beech	--	--	--	--	--	--	--
Yellow birch	7,085	494	--	--	--	--	--
Hard maple	25,960	1,813	--	--	--	--	--
Soft maple	24,523	1,716	--	--	--	--	8
Elm	78,460	5,488	--	--	--	--	--
Ash	23,485	1,644	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--
Bigtooth aspen	10,122	708	1	1	--	--	17
Quaking aspen	25,901	1,811	4	4	--	--	44
Paper birch	18,553	1,300	--	--	--	--	3
Black walnut	--	--	--	--	--	--	--
Other hardwoods [5]	5,280	368	42	42	--	--	4
Total	483,561	33,829	132	131	350	2	81
All species	493,273	34,503	544	555	450	3	81

[2] 128 cubic feet; includes wood, bark, and air space.

[4] Less than 500 cubic feet.

[5] Includes butternut and black cherry.

Table 63.--Volume of primary plant residue by use and type of residue, Central Unit, Wisconsin, 1981

(In thousand cubic feet)

Use	Wood residue						Bark [3]	
	Total		Coarse [1]		Fine [2]			
	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods
Fiber products [4]	312.3	2,755.4	277.0	2,408.0	35.3	347.4	--	--
Charcoal	0.9	20.7	--	--	0.9	20.7	--	--
Industrial fuel	99.7	999.9	70.4	317.4	29.3	682.5	114.1	1,482.3
Domestic fuel	307.7	1,677.0	306.4	1,589.0	1.3	88.0	144.2	646.5
Miscellaneous [5]	408.2	1,794.1	72.7	255.4	335.5	1,538.7	175.7	789.8
Not used [6]	31.8	241.6	6.7	92.2	25.1	149.4	32.4	164.5
Total	1,160.6	7,488.7	733.2	4,662.0	427.4	2,826.7	466.4	3,083.1

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark disposal at pulpmills.

[4] For manufacture of pulp, hardboard, or roofing felt.

[5] Livestock bedding, mulch, small dimension, and specialty items.

[6] Includes residue burned as waste.

Table 64.--All live tree biomass on commercial forest land by species group and forest type, Central Unit, Wisconsin, 1983

(In green tons)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	11,587,009	6,963,726	376,580	262,262	--	--	--	--
Red pine	10,432,071	322,312	9,016,751	451,886	20,359	--	--	--
White pine	7,361,201	124,844	326,824	3,064,760	63,216	--	75,736	22,613
White spruce	196,230	--	12,158	37,585	--	122,541	--	--
Black spruce	329,812	--	10,019	--	--	--	209,650	12,557
Balsam fir	1,215,088	--	--	21,155	243,728	--	--	225,660
Hemlock	1,543,854	--	--	--	--	--	--	62,126
Tamarack	1,419,348	1,183	--	23,598	--	--	42,230	71,736
Eastern redcedar	33,574	5,648	--	--	--	--	--	--
Northern white-cedar	1,546,090	--	--	--	4,128	--	--	1,099,374
Other softwoods	239,930	--	137,446	--	--	--	--	--
Total	35,904,207	7,417,713	9,879,778	3,861,246	331,431	122,541	327,616	1,494,066
Hardwoods								
White oak	14,327,755	64,094	36,168	282,097	--	--	--	--
Select red oak	23,248,146	193,116	53,905	43,797	9,727	--	--	16,848
Other red oak	31,819,564	1,273,203	351,561	779,246	--	--	--	8,303
Select hickory	545,926	--	--	19,459	--	--	--	--
Other hickory	912,687	--	--	--	--	--	--	--
Basswood	3,978,186	--	8,626	10,172	6,836	--	--	12,432
Beech	84,687	--	19,716	--	--	--	--	--
Yellow birch	2,337,073	--	--	37,619	17,197	--	--	34,378
Hard maple	8,456,590	--	40,853	89,978	--	--	--	--
Soft maple	21,110,648	45,689	22,381	286,319	29,775	--	--	52,365
Elm	3,389,723	11,961	--	--	9,739	--	--	15,792
Black ash	3,956,089	--	--	55,747	42,977	--	--	96,413
White & green ash	2,375,461	--	18,668	21,439	--	--	--	--
Cottonwood	159,120	15,892	--	--	--	--	--	--
Willow	182,269	--	--	--	--	--	--	--
Hackberry	539	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--
Bigtooth aspen	7,340,377	36,942	8,567	117,341	--	--	--	--
Quaking aspen	18,761,152	412,308	68,395	495,053	--	--	--	46,119
Paper birch	8,924,944	60,952	22,150	163,884	33,633	--	37,073	125,691
River birch	234,260	--	--	--	--	--	--	--
Black cherry	2,269,467	2,686	3,574	95,790	3,956	--	--	--
Black walnut	34,566	--	--	--	--	--	--	--
Butternut	364,144	--	--	--	--	--	--	--
Other hardwoods	455,199	14,333	--	--	--	--	--	--
Noncommercial species	1,539,196	1,384	2,322	21,657	--	--	--	--
Total	156,807,768	2,132,560	656,886	2,519,598	153,840	--	37,073	408,341
All species	192,711,975	9,550,273	10,536,664	6,380,844	485,271	122,541	364,689	1,902,407

(Table 64 continued on next page)

(Table 64 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotics	Nonstocked
Softwoods								
Jack pine	--	2,615,569	51,498	308,259	910,627	87,542	--	10,946
Red pine	--	260,184	14,647	137,650	109,877	82,468	15,937	--
White pine	30,777	1,270,574	440,334	1,429,243	322,733	178,406	--	11,141
White spruce	--	--	6,387	13,921	--	--	3,638	--
Black spruce	10,036	--	11,689	11,623	64,238	--	--	--
Balsam fir	--	83,802	185,644	338,974	67,606	48,519	--	--
Hemlock	--	6,968	177,410	1,267,803	18,970	10,577	--	--
Tamarack	954,376	1,496	203,529	5,238	28,158	70,713	--	17,091
Eastern redcedar	--	25,949	--	--	1,977	--	--	--
Northern white-cedar	7,307	6,488	240,299	138,748	--	49,746	--	--
Other softwoods	--	30,407	--	--	--	--	72,077	--
Total	1,002,496	4,301,437	1,331,437	3,651,459	1,524,186	527,971	91,652	39,178
Hardwoods								
White oak	--	10,659,300	539,853	1,309,472	861,695	395,859	--	179,217
Select red oak	--	16,771,361	601,584	3,363,449	1,798,938	386,869	--	8,552
Other red oak	--	25,397,222	405,312	961,253	2,116,174	110,483	--	416,807
Select hickory	--	398,440	15,231	10,262	5,543	88,546	--	8,445
Other hickory	--	339,377	--	526,275	47,035	--	--	--
Basswood	--	401,512	571,518	2,631,765	195,965	32,596	--	106,764
Beech	--	--	--	64,971	--	--	--	--
Yellow birch	4,938	67,981	417,873	1,699,152	29,054	28,881	--	--
Hard maple	--	806,112	63,469	7,125,946	194,502	135,730	--	--
Soft maple	55,228	3,753,143	5,806,100	6,641,548	3,965,620	426,908	--	25,572
Elm	29,949	353,352	901,551	1,593,619	265,970	128,207	--	79,583
Black ash	17,885	179,562	2,584,485	499,360	326,801	120,979	--	31,880
White & green ash	--	338,122	578,837	1,249,076	116,039	53,280	--	--
Cottonwood	--	89,859	18,931	12,200	11,108	11,130	--	--
Willow	--	--	90,164	21,159	61,005	9,941	--	--
Hackberry	--	--	--	539	--	--	--	--
Balsam poplar	--	--	--	---	--	--	--	--
Bigtooth aspen	22,575	2,446,946	7,575	863,844	3,641,272	195,315	--	--
Quaking aspen	34,596	1,801,631	827,123	1,887,323	12,428,725	664,837	--	95,042
Paper birch	23,873	1,664,340	583,163	1,253,082	2,315,386	2,623,293	--	18,424
River birch	--	40,082	194,178	--	--	--	--	--
Black cherry	--	971,285	274,574	490,079	370,356	52,740	--	4,427
Black walnut	--	23,681	--	10,885	--	--	--	--
Butternut	--	163,112	--	159,996	14,007	15,536	--	11,493
Other hardwoods	--	72,985	307,680	40,175	20,026	--	--	--
Noncommercial species	--	324,517	117,172	755,560	275,198	41,386	--	--
Total	189,044	67,063,922	14,906,373	33,170,990	29,060,419	5,522,516	--	986,206
All species	1,191,540	71,365,359	16,237,810	36,822,449	30,584,605	6,050,487	91,652	1,025,384

Table 65.--All live tree biomass by species group and tree biomass component, Central Unit, Wisconsin, 1983

(In green tons)

Species group	All components	Biomass component: All live 1- to 5-inch trees	Growing stock: Boles	Growing stock: Tops and limbs	Cull: Boles	Cull: Tops and limbs
Softwoods						
Jack pine	11,587,009	1,982,679	6,081,618	2,590,866	672,134	259,712
Red pine	10,432,071	1,273,115	6,304,958	2,711,601	104,116	38,281
White pine	7,361,201	737,781	4,184,850	1,796,349	450,001	192,220
White spruce	196,230	167,568	20,310	8,352	--	--
Black spruce	329,812	212,764	82,811	34,237	--	--
Balsam fir	1,215,088	489,853	472,136	193,610	41,814	17,675
Hemlock	1,543,854	50,486	904,213	379,748	147,061	62,346
Tamarack	1,419,348	323,892	738,559	310,526	32,613	13,758
Eastern redcedar	33,574	13,702	7,660	3,152	6,409	2,651
Northern white-cedar	1,546,090	586,164	591,444	240,062	93,895	34,525
Other softwoods	239,930	81,521	74,595	30,919	41,404	11,491
Total	35,904,207	5,919,525	19,463,154	8,299,422	1,589,447	632,659
Hardwoods						
White oak	14,327,755	997,625	6,610,259	2,742,134	2,872,288	1,105,449
Select red oak	23,248,146	412,988	13,333,723	5,666,592	2,695,845	1,138,998
Other red oak	31,819,564	1,627,874	13,106,278	5,490,472	8,234,946	3,359,994
Select hickory	545,926	72,849	215,953	91,659	121,884	43,581
Other hickory	912,687	148,283	482,205	204,629	54,454	23,116
Basswood	3,978,186	307,728	2,206,065	937,968	375,397	151,028
Beech	84,687	--	36,015	15,288	23,401	9,983
Yellow birch	2,337,073	235,283	936,054	390,388	550,591	224,757
Hard maple	8,456,590	679,544	4,170,069	1,773,228	1,304,202	529,547
Soft maple	21,110,648	3,880,047	9,504,424	4,046,447	2,682,790	996,940
Elm	3,389,723	566,977	1,561,423	644,361	457,122	159,840
Black ash	3,956,089	584,061	2,085,964	872,854	317,076	96,134
White & green ash	2,375,461	226,736	1,228,914	523,093	278,135	118,583
Cottonwood	159,120	--	80,745	34,271	30,979	13,125
Willow	182,269	8,428	105,454	44,537	16,708	7,142
Hackberry	539	539	--	--	--	--
Balsam poplar	--	--	--	--	--	--
Bigtooth aspen	7,340,377	643,172	4,356,953	1,890,685	314,545	135,022
Quaking aspen	18,761,152	2,731,446	9,925,964	4,263,834	1,358,506	481,402
Paper birch	8,924,944	1,997,665	3,995,727	1,699,051	908,863	323,638
River birch	234,260	28,450	84,966	36,193	59,423	25,228
Black cherry	2,269,467	549,401	573,084	243,994	714,376	188,612
Black walnut	34,566	--	7,642	3,243	16,580	7,101
Butternut	364,144	1,215	168,244	71,889	86,121	36,675
Other hardwoods	455,199	85,870	127,447	53,257	139,082	49,543
Noncommercial species	1,539,196	--	--	--	1,422,406	116,790
Total	156,807,768	15,786,181	74,903,572	31,740,067	25,035,720	9,342,228
All species	192,711,975	21,705,706	94,366,726	40,039,489	26,625,167	9,974,887

Table 66.--Sampling errors[1/] for estimates smaller than the Unit totals of volume, net growth, removals, and area of commercial forest land, Central Unit, Wisconsin, 1983

Sampling error	Commercial forest land	Growing stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	- - - -Thousand cubic feet- - - -			- - - -Thousand board feet[2/]- - -		
1	359.6	20,324,205	1,383,661	21,410,144	92,215,433	6,530,537	72,628,928
2	89.9	5,081,051	345,915	5,352,536	23,053,858	1,632,634	18,157,232
3	40.0	2,258,245	153,740	2,378,905	10,246,159	725,615	8,069,881
4	22.5	1,270,263	86,479	1,338,134	5,763,465	408,159	4,539,308
5	14.4	812,968	55,346	856,406	3,688,617	261,221	2,905,157
10	3.6	203,242	13,837	214,101	922,154	65,305	726,289
15	1.6	90,330	6,150	95,156	409,846	29,025	322,795
20	0.9	50,811	3,459	53,525	230,539	16,326	181,572
25	0.6	32,519	2,214	34,256	147,545	10,449	116,206
50	0.1	8,130	553	8,564	36,886	2,612	29,052
100	0.0	2,032	138	2,141	9,222	653	7,263

[1/] At the 68-percent probability level.

[2/] International 1/4-inch rule.

Table 67.--Sampling errors for county totals of growing-stock volume, net growth, removals, and area of commercial forest land, Central Unit, Wisconsin, 1983

(Percent of estimate)

County	Commercial forest land	Growing stock		
		Inventory	Growth	Removals
Adams	1.24	11.30	13.79	103.62
Chippewa	1.26	9.80	14.15	75.33
Clark	1.07	8.09	11.09	71.66
Eau Claire	1.53	11.19	15.22	133.33
Jackson	0.98	7.86	10.50	142.12
Juneau	1.19	9.77	13.02	140.46
Marathon	1.00	7.29	10.33	49.92
Marquette	1.95	17.93	23.53	165.14
Monroe	1.21	10.39	15.42	151.34
Portage	1.44	11.12	14.77	123.44
Waupaca	1.44	9.17	14.15	101.28
Waushara	1.57	11.66	15.39	348.21
Wood	1.32	10.69	14.00	82.05
All counties	0.35	2.72	3.73	26.52

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Hahn, Jerold T.
Timber resource of Wisconsin's Central Survey Unit, 1983. Resour. Bull. NC-84. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1985. 88 p.

The timber resource of the Central Wisconsin Survey Unit increased 4.2 percent in commercial forest area and increased 75 percent in growing-stock volume between 1968 and 1983. Highlights and statistics from the fourth inventory of this unit are presented for area, volume, growth, mortality, removals, utilization, and biomass.

KEY WORDS: Statistics, area, volume, growth, mortality, removals.

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Resource ~~Research~~

Bulletin **NC-85**

Pulpwood Production in the North-Central Region by County, 1983

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HIGHLIGHTS

Lake States

Pulpwood production rose 18 percent to a record 6.54 million cords in 1983. The aspen harvest accounted for most of the gain, rising 923,000 cords, and shattering the previous aspen record harvest in 1981 by 37 percent. Birch and balsam poplar harvests also reached all-time highs. Output from softwoods fell in every species group except cedar and white pine. Nine percent of the total production was whole-tree chips; aspen remained the preferred species. Output nearly doubled for flakeboard plants and gained 8 percent for pulpmills. Production broke records in each State and climbed 29 percent in Minnesota, 23 percent in Michigan, and 8 percent in Wisconsin. Michigan output exceeded 2 million cords for the first time. Aspen constituted 77 percent of the roundwood cut in Minnesota.

For the third straight year, softwood residue imports from Canada fell and were slightly more than one-third of the peak imports in 1980. Twenty-three percent of Wisconsin's pulpwood requirements came from out-of-State.

Central States

Central States pulpwood production increased to 448,000 cords, the highest level since 1979. Nearly 7 out of 10 cords were residue from wood-using mills. Indiana, the leading producer, topped all previous years. Each of the other Central States had production gains. Exports, 68 percent of the total, rose for the fifth consecutive year.

Pulpwood receipts expanded to 148,000 cords from 106,000 cords in 1982. Nevertheless, receipts were the second lowest since 1958. Only 5,000 cords were imported.

Except for 1982, production has exceeded 400,000 cords annually since 1969. More than 3 out of 5 cords produced are likely to continue being exported to states adjacent to the Central States.

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PULPWOOD PRODUCTION IN THE NORTH CENTRAL REGION BY COUNTY, 1983

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This is the 25th annual report of the pulpwood harvest in Lake States counties and the 24th annual report of the Central States harvest. Pulpwood constitutes more than half the industrial timber products harvested annually in the Lake States (Michigan, Minnesota, and Wisconsin) and is an important product in the Central States (Illinois, Indiana, Iowa, and Missouri).

Current detailed pulpwood production[1] information is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, and forest industry development. Also, researchers need current pulpwood information to plan projects.

Since 1979, we have included logs, bolts and wood residue used in manufacturing particleboard, waferboard, and oriented strand board in this annual series. Together, these boards are called flakeboards. Wood used at flakeboard plants is identical or nearly identical to wood used at pulpmills.

Because flakeboard plants primarily use aspen and wood residue, including them does not distort roundwood use trends for other species nor preclude comparing survey results with 1978 and previous year.

Pulpmills and flakeboard plants using North Central States timber in 1983 reported their pulpwood receipts[2] by species groups and counties of origin. This report presents the results of the survey, analyzes the data where appropriate, compares results with 1982 or earlier years, and discusses trends in pulpwood production and use.

The Lake States and Central States are discussed separately because the timber types in each area are different and less information can be released about the Central States (more detailed data on pulpwood production and receipts in the Central States would reveal the operations of individual mills).

Pulpwood production in Minnesota is completely and accurately shown. However, to prevent disclosure of confidential information about softwood pulpwood use by individual companies, the total quantity of softwood pulpwood imports and exports between Minnesota and Canada are not reported. **Thus, some Minnesota softwood shipped to Canada is shown as remaining and used in Minnesota, and receipts of Canadian softwood in Minnesota are understated.**

LAKE STATES

Production

Pulpwood production climbed from 5.52 million cords[3] in 1982 to a record 6.54 million cords in 1983, a gain of 18 percent (table 1). Of each 100 cords produced, 92 cords were roundwood (including chips from roundwood); the remainder was residue from wood-using plants.[4]

Major species cut were aspen (3,306,000 cords), jack pine (450,000 cords), red pine (302,000 cords), white birch (277,000 cords), and balsam fir (276,000 cords).

---

[1] *Pulpwood production, determined from mill receipts, is the annual volume of pulpwood cut in a specific county or region, plus the annual wood residue volume produced by sawmills, veneer mills, etc., in a specific State or region that was used for pulp, particleboard, waferboard, or oriented-strand-board.*

[2] *Pulpwood receipts are the volume of wood received by mills in a specific State or region, regardless of the geographic source.*

[3] *All references to cords are in standard cords. A standard cord is 128 cubic feet of wood, bark, and air space.*

[4] *Residue is the byproduct from sawmills, veneer mills, cooperage mills, and other wood-using plants that is used for pulping and flakeboard. Residue includes slabs, edgings, veneer cores, sawdust, wood flour, and chips manufactured from slabs, edgings, and veneer cores.*

Table 1.--Production and imports of pulpwood, Lake States, 1983

(In standard cords, unpeeled)

Species and destination	Production by States [1]				Imports			Total receipts
	Michigan	Minnesota	Wisconsin	Regional total	Other U.S. [2]	Canada	Total imports	
Roundwood								
Cedar								
Michigan	23,579	--	303	23,882	--	--	--	23,882
Total	23,579	--	303	23,882	--	--	--	23,882
Balsam fir								
Michigan	62,137	--	640	62,777	--	--	--	62,777
Minnesota	--	86,804	233	87,037	--	--	--	87,037
Wisconsin	29,549	769	83,942	114,260	--	--	--	114,260
Exported [3]	9,616	2,592	--	12,208	--	--	--	--
Total	101,302	90,165	84,815	276,282	--	--	--	264,074
Hemlock								
Michigan	45,078	--	821	45,899	--	--	--	45,899
Wisconsin	3,361	--	39,617	42,978	--	--	--	42,978
Total	48,439	--	40,438	88,877	--	--	--	88,877
Jack pine								
Michigan	109,706	--	68	109,774	--	--	--	109,774
Minnesota	--	90,437	7,202	97,639	--	--	--	97,639 [5]
Wisconsin	35,972	9,175	194,896	240,043	4,783 [4]	--	4,783 [4]	244,826 [5]
Exported [3]	1,131	1,391	--	2,522	--	--	--	--
Total	146,809	101,003	202,166	449,978	4,783 [4]	--	4,783 [4]	452,239 [5]
Red pine								
Michigan	78,353	--	155	78,508	--	--	--	78,508
Minnesota	--	19,703	4,583	24,286	--	--	--	24,286
Wisconsin	15,108	5,500	178,426	199,034	--	--	--	199,034
Total	93,461	25,203	183,164	301,828	--	--	--	301,828
White pine								
Michigan	15,142	--	195	15,337	--	--	--	15,337
Minnesota	--	14,190	1,310	15,500	--	--	--	15,500
Wisconsin	1,120	35	25,353	26,508	--	--	--	26,508
Total	16,262	14,225	26,858	57,345	--	--	--	57,345
Spruce								
Michigan	50,607	--	502	51,109	--	--	--	51,109
Minnesota	--	74,126	110	74,236	--	3,708	3,708	77,944
Wisconsin	18,502	18,794	27,147	64,443	--	186	186	64,629
Exported [3]	8,523	2,034	--	10,557	--	--	--	--
Total	77,632	94,954	27,759	200,345	--	3,894	3,894	193,682
Tamarack								
Michigan	3,147	--	38	3,185	--	--	--	3,185
Minnesota	--	8,258	--	8,258	--	--	--	8,258
Wisconsin	3,700	17,802	5,903	27,405	--	--	--	27,405
Total	6,847	26,060	5,941	38,848	--	--	--	38,848
Ash								
Michigan	8,419	--	--	8,419	--	--	--	8,419
Wisconsin	2,634	316	46,836	49,786	--	--	--	49,786
Total	11,053	316	46,836	58,205	--	--	--	58,205
Aspen								
Michigan	744,116	--	2,175	746,291	--	--	--	746,291
Minnesota	--	1,274,316	38,376	1,312,692	--	--	--	1,312,692
Wisconsin	144,863	90,776	984,579	1,220,218	--	--	--	1,220,218
Exported [3]	--	26,474	--	26,474	--	--	--	--
Total	888,979	1,391,566	1,025,130	3,305,675	--	--	--	3,279,201
Balsam poplar								
Michigan	38,972	--	--	38,972	--	--	--	38,972
Minnesota	--	67,540	1,204	68,744	--	--	--	68,744
Wisconsin	634	--	260	894	--	--	--	894
Total	39,606	67,540	1,464	108,610	--	--	--	108,610
Basswood								
Michigan	20,668	--	--	20,668	--	--	--	20,668
Wisconsin	732	--	12,512	13,244	--	--	--	13,244
Total	21,400	--	12,512	33,912	--	--	--	33,912
Beech								
Michigan	17,530	--	--	17,530	--	--	--	17,530
Wisconsin	759	--	1,128	1,887	--	--	--	1,887
Total	18,289	--	1,128	19,417	--	--	--	19,417
White birch								
Michigan	87,745	--	948	88,693	--	--	--	88,693
Minnesota	--	1,258	--	1,258	--	--	--	1,258
Wisconsin	8,479	2,855	175,743	187,077	--	--	--	187,077
Total	96,224	4,113	176,691	277,028	--	--	--	277,028
Yellow birch								
Michigan	25,312	--	--	25,312	--	--	--	25,312
Wisconsin	8,135	42	21,244	29,421	--	--	--	29,421
Total	33,447	42	21,244	54,733	--	--	--	54,733
Cottonwood								
Michigan	2,111	--	--	2,111	--	--	--	2,111
Total	2,111	--	--	2,111	--	--	--	2,111
Elm								
Michigan	18,013	--	--	18,013	--	--	--	18,013
Wisconsin	21,572	137	55,802	77,511	--	--	--	77,511
Total	39,585	137	55,802	95,524	--	--	--	95,524

(Table 1 continued on next page)

(Table 1 continued)

Species and destination	Production by States[1]				Imports			
	Michigan	Minnesota	Wisconsin	Regional total	Other U.S.[2]	Canada	Total imports	Total receipts
Hickory								
Michigan	620	--	--	620	--	--	--	620
Wisconsin	--	--	374	374	--	--	--	374
Total	620	--	374	994	--	--	--	994
Hard maple								
Michigan	58,371	--	--	58,371	--	--	--	58,371
Wisconsin	36,673	400	141,571	178,644	--	--	--	178,644
Total	95,044	400	141,571	237,015	--	--	--	237,015
Soft maple								
Michigan	110,004	--	--	110,004	--	--	--	110,004
Wisconsin	13,783	129	95,451	109,363	--	--	--	109,363
Total	123,787	129	95,451	219,367	--	--	--	219,367
Red oak								
Michigan	68,086	--	--	68,086	--	--	--	68,086
Wisconsin	1,309	--	47,138	48,447	--	--	--	48,447
Total	69,395	--	47,138	116,533	--	--	--	116,533
White oak								
Michigan	22,899	--	--	22,899	--	--	--	22,899
Wisconsin	292	--	11,978	12,270	--	--	--	12,270
Total	23,191	--	11,978	35,169	--	--	--	35,169
Other hardwoods								
Michigan	5,491	--	--	5,491	--	--	--	5,491
Wisconsin	1,858	--	7,369	9,227	--	--	--	9,227
Total	7,349	--	7,369	14,718	--	--	--	14,718
Total roundwood								
Michigan	1,616,106	--	5,845	1,621,951	--	--	--	1,621,951
Minnesota	--	1,636,632	53,018	1,689,650	--	3,708	3,708	1,693,358
Wisconsin	349,035	146,730	2,157,269	2,653,034	4,783	186	4,969	2,658,003
Exported[3]	19,270	32,491	--	51,761	--	--	--	--
Total	1,984,411	1,815,853	2,216,132	6,016,396	4,783	3,894	8,677	5,973,312
Softwood residue								
Michigan	16,790	--	185	16,975	--	--	--	16,975
Minnesota	--	46,363	--	46,363	--	1,274	1,274	47,637
Wisconsin	3,983	7,704	47,759	59,446	131,836	31,003	162,839	222,285
Exported[3]	--	1,167	--	1,167	--	--	--	--
Total	20,773	55,234	47,944	123,951	131,836	32,277	164,113	286,897
Hardwood residue								
Michigan	114,065	--	16,627	130,692	17,390	--	17,390	148,082
Minnesota	--	36,657	--	36,657	--	4,203	4,203	40,860
Wisconsin	38,192	1,110	193,802	233,104	--	415	415	233,519
Exported[3]	--	929	--	929	--	--	--	--
Total	152,257	38,696	210,429	401,382	17,390	4,618	22,008	422,461
All wood material								
Michigan	1,746,961	--	22,657	1,769,618	17,390	--	17,390	1,787,008
Minnesota	--	1,719,652	53,018	1,772,670	--	9,185	9,185	1,781,855
Wisconsin	391,210	155,544	2,398,830	2,945,584	136,619	31,604	168,223	3,113,807
Exported[3]	19,270	34,587	--	53,857	--	--	--	--
Total	2,157,441	1,909,783	2,474,505	6,541,729	154,009	40,789	194,798	6,682,670

[1] Vertical columns of figures under box heading "Production by States" present the amount of pulpwood cut in each State.

[2] Mostly western States.

[3] Pulpwood shipped to mills outside of region.

[4] Ponderosa pine.

[5] Includes ponderosa pine from other U.S.

Other important species, each contributing more than 200,000 cords, were hard maple, soft maple, and spruce.

Pulpwood production from hardwoods rose above the previous high in 1981 by 915,000 cords. Pulpwood output from hardwood roundwood set a record, but the higher output from hardwood mill residue fell 56,000 cords short of the peak in 1981. Harvests of aspen, birch, and balsam poplar advanced to record levels. Aspen eclipsed the 1981 peak by 887,000 cords. Birch surpassed the 1980 high by 28,000 cords and balsam poplar reached a new high for the fourth consecutive year.

Softwood production fell 184,000 cords from 1982, although production from mill residue increased to a record 124,000 cords. Output dropped in each softwood species except cedar and white pine. Major declines were in jack pine (86,000 cords) and red pine (44,000 cords). Red pine set production records the previous 4 years and, despite the decline, had the second highest output in 1983.

Lake States loggers produced a record 604,000 cords of whole-tree chips[5] (WTC), up 31 percent from 1982. WTC accounted for 9 percent of the Lake States pulpwood output. One out of 5 cords produced in Michigan was WTC. Minnesota WTC output doubled from 1982; Wisconsin WTC output remained nominal even

[5] *Pulpwood produced from chipping entire trees (all portions of trees above ground, except the stumps).*

though production more than doubled. Production of WTC by species group and State was:

State	Softwoods	Aspen	Other hardwoods
	(Thousand cords)		
Michigan	18.0	292.4	124.7
Minnesota	--	129.4	13.6
Wisconsin	--	23.2	2.5

Michigan.--For the first time, Michigan production exceeded 2 million cords. Pulpwood production rose to 2.16 million cords, a gain of 23 percent from 1982 and 9 percent from the previous high in 1979. Demand for aspen and birch reached peak levels. Marquette, Iron, Delta, Menominee, and Baraga Counties were the leading producers.

Minnesota.--Minnesota's output of 1.91 million cords broke the old high in 1974 by 21 percent and surpassed 1982 by 29 percent. Aspen provided most of the gain, rising 526,000 cords (61 percent) from 1982. Demand for aspen was strong at flakeboard plants. Aspen dominated the harvest, accounting for 77 percent of all roundwood cut and 95 percent of all hardwood harvested. Demand for softwoods weakened, with pine and spruce production at all-time lows. Five counties--St. Louis, Itasca, Koochiching, Beltrami, and Cass--supplied 71 percent of the roundwood.

Wisconsin.--Wisconsin producers furnished 2.47 million cords of pulpwood, 8 percent more than in 1982 and 4 percent more than the record set in 1981. The aspen harvest exceeded 1 million cords for the first time. Birch production nudged above the high in 1980. Contrary to the general uptrend, pine output dropped 82,000 cords. Top-producing counties were Marinette, Bayfield, Oneida, Forest, Douglas, Vilas, Sawyer, Price, and Langlade.

In this report we show the distribution of the harvest in two ways: first, the amount of pulpwood cut relative to the growing stock volume in each of five major pulpwood species (fig. 1); and, second, the amount of pulpwood cut relative to commercial forest area (fig. 2). For the major supply areas, pulpwood harvesting was most intensive for jack pine in the

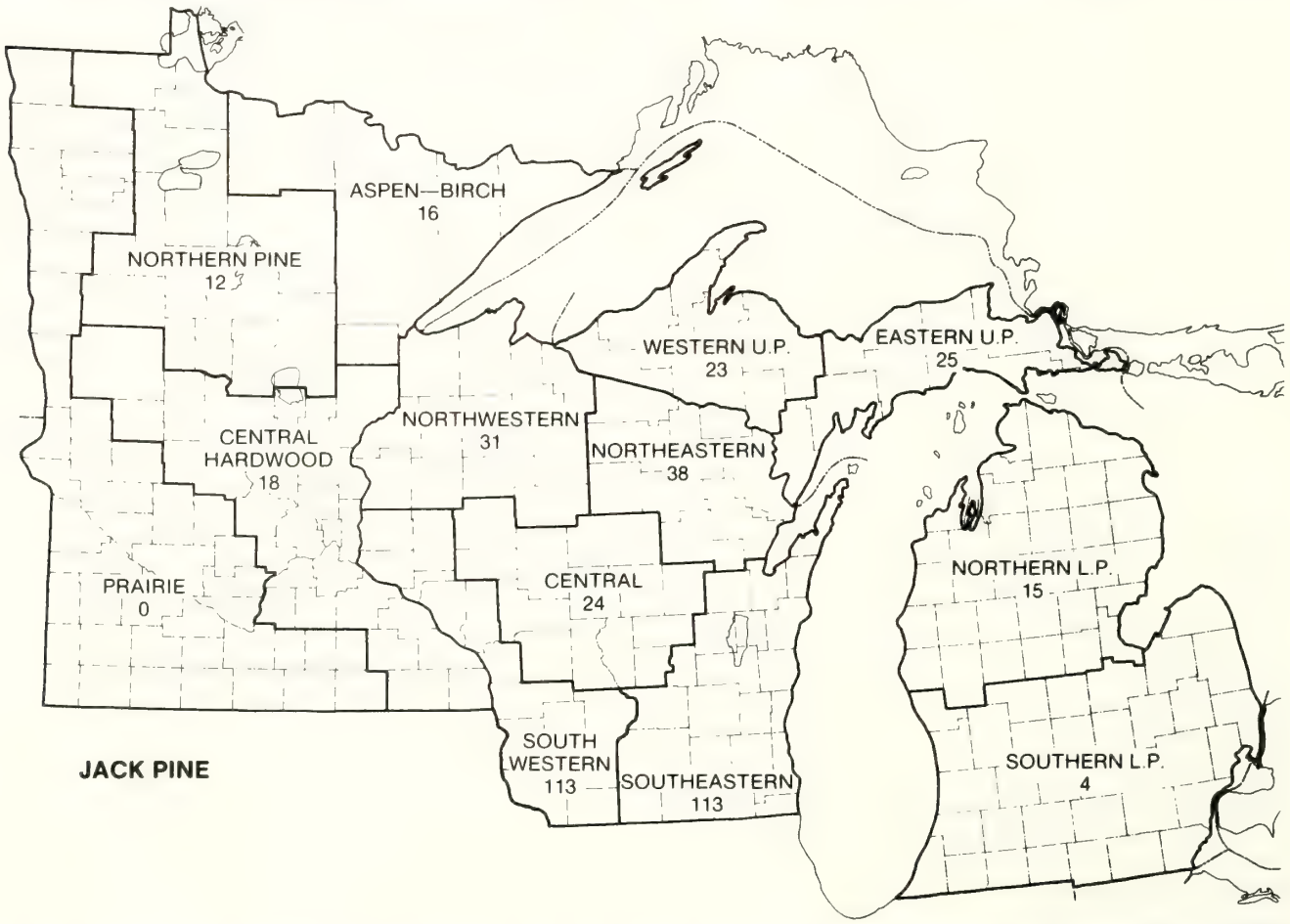


Figure 1.--*Cords of roundwood pulpwood (including chips from roundwood) harvested per 1,000 cords of merchantable volume in five principal pulpwood species by Forest Survey Unit, 1983. Merchantable volume was determined during the last forest inventory in each State.*

(Figure 1 continued)

Northeastern and Northwestern Wisconsin Survey Units; for red pine in the Central Unit of Wisconsin; for spruce in the Northern Pine Unit of Minnesota; for balsam fir in northeastern Wisconsin; and for aspen in northern Wisconsin, northern Minnesota, and the northern Lower Peninsula of Michigan.

Pulpwood harvesting was more than 200 cords per thousand acres of stocked commercial forest land in the following counties:

Michigan
Mason
Delta
Dickinson
Menominee
Iron

Minnesota
Itasca
Hubbard
Koochiching

Wisconsin
Vilas
Langlade
Marinette
Florence
Menominee
Forest
Oneida
Bayfield
Douglas
Price

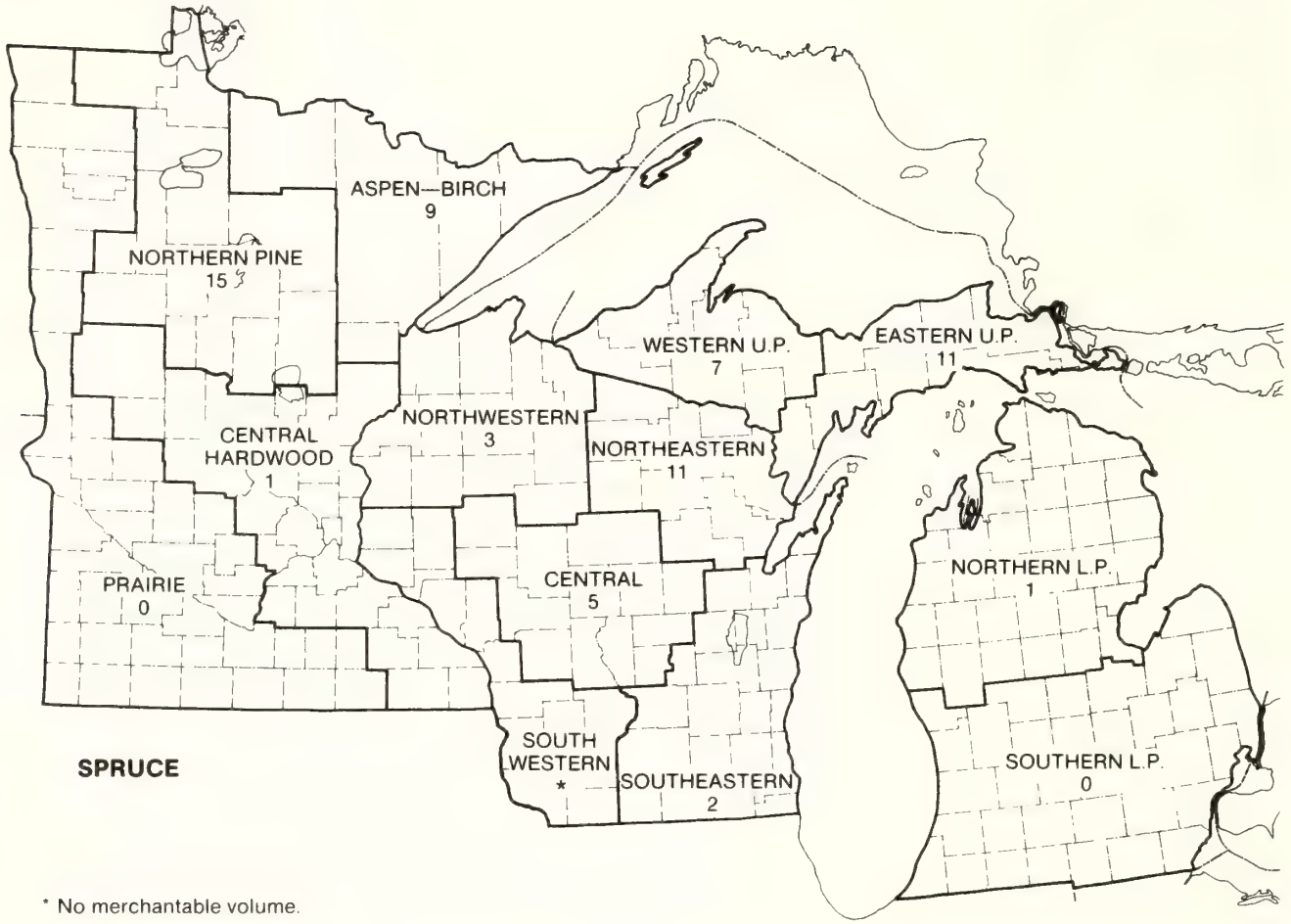
Receipts

Thirty-eight pulp, three particleboard, three waferboard, and three oriented-strand-board mills received 6.68 million cords of pulpwood in 1983, more than a million-cord increase from 1982. Forty-three of the 47 operating mills used aspen and 22 used birch (table 2).

Imports of Canadian softwood residue fell for the third consecutive year to slightly more than one-third of the peak imports set in 1980. After 3 declining years, softwood residue shipments to the Lake States from other areas of the U.S. increased, but, excluding 1982, remained lower than in any year since 1967; South Dakota and Wyoming were the principal suppliers.

Lake States mills have never imported hardwood roundwood in quantity from other States and Canada. These hardwood imports topped out in 1969 at 21,000 cords; none has been received in the Lake States since 1980.

(Figure 1 continued)



* No merchantable volume.

Michigan.--Out-of-State sources supplied only 2 percent of the 1.79 million cords received in Michigan. Hardwood mill residue was the chief import. Demand was highest for aspen, jack pine, soft maple, and white birch.

Wisconsin.--Twenty-three percent of the 3.11 million cords received at 25 Wisconsin mills came from out-of-State. Michigan furnished 391,000 cords, Minnesota 156,000 cords, other (primarily western) States 137,000 cords, and Canada 32,000 cords. Nearly three-fifths of the spruce and nearly four-fifths of the tamarack was imported. Wisconsin mills received 73 out of every 100 cords of softwood residue from Canada and States beyond the Lake States.

Minnesota.--Minnesota pulpwood receipts are not fully reported (see earlier explanation).

Industry Trends and Analysis

Pulpmills

Average daily pulp production remained unchanged from 10,770 tons per day in 1982 (table 3). Three pulp mills each had average daily production of 800 tons or more; six each averaged less than 100 tons. Average mill size has been increasing for more than a decade as smaller mills closed and larger mills expanded their capacity. In 1970, 10 mills each produced less than 100 tons daily, and only one mill had a daily capacity of

(Figure 1 continued)

* No merchantable volume.

800 tons or more. Six more pulp mills operated in 1970 than in 1983, but daily capacity was at least 11 percent lower during 1970 in the Lake States.

Lake States pulpwood production for pulpmills in 1981, 1982, and 1983 was:

Species	Production		
	1981	1982	1983
Roundwood	(Thousand cords)		
Aspen	2,037	1,828	2,133
Other species	2,568	2,621	2,618
Residue	496	384	445
Total	5,101	4,833	5,196

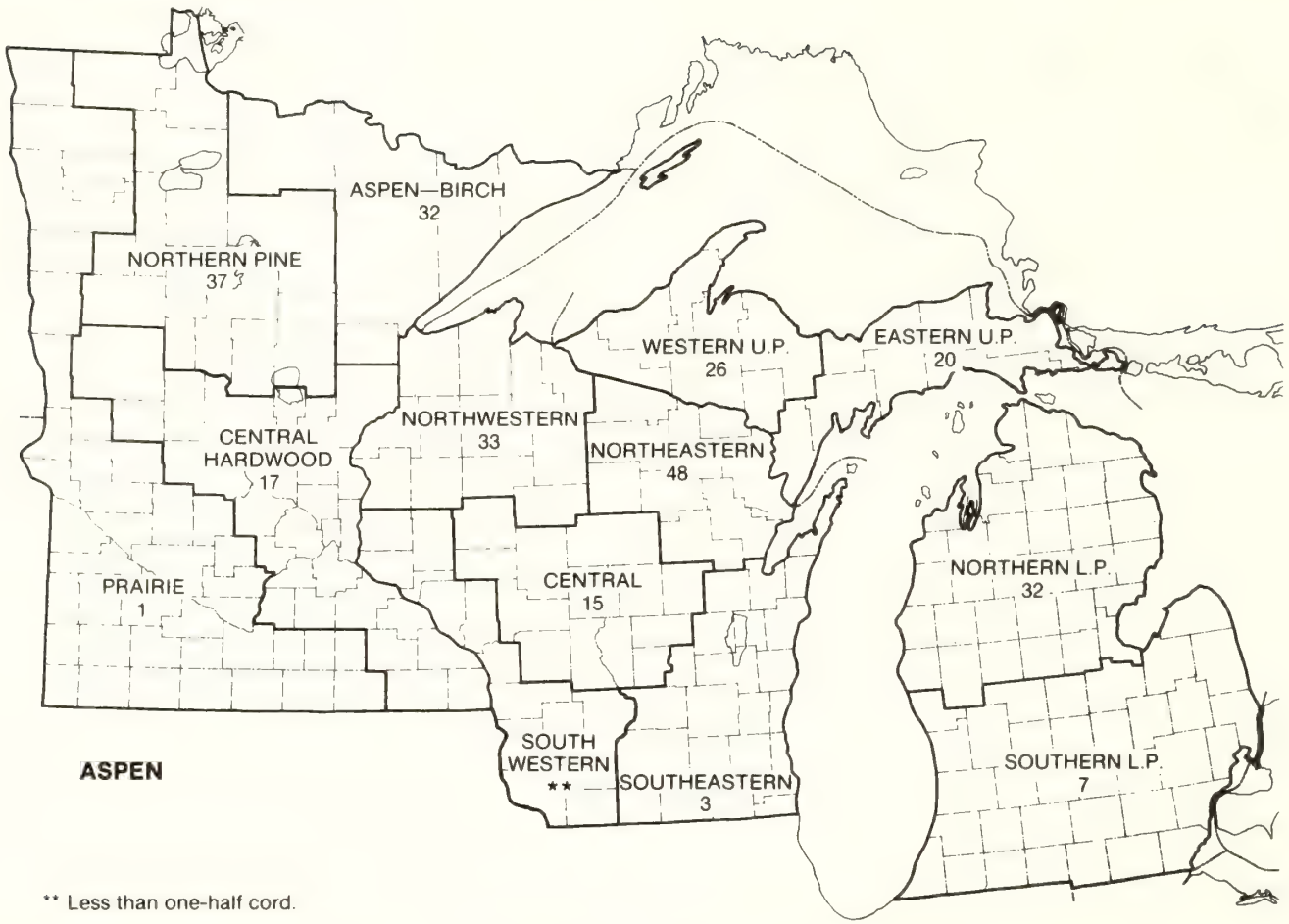
Pulpwood production destined for pulpmills rose 7.5 percent in the Lake States during 1983. This increase compares favorably with the 6.5 percent rise in U.S. woodpulp production in 1983.

Flakeboard mills

Minnesota's second oriented-strand-board (OSB) plant began operating in 1983. Annual production capacity of the Lake States flakeboard plants was 860 million square feet as shown below:

Company	Location	Capacity (Million square feet ¾-inch basis)
Champion International Corp.	Gaylord, MI	175
Weyerhaeuser Co.	Grayling, MI	105
Blandin Wood Products Co.	Grand Rapids, MN	135
Northwood Panelboard Co.	Bemidji, MN	80
Potlatch Corp.	Bemidji, MN	75
Potlatch Corp.	Cook, MN	80
Louisiana — Pacific	Hayward, WI	130
Rodman Industries	Marinette, WI	15
Weyerhaeuser Co.	Marshfield, WI	65
		860

(Figure 1 continued)



** Less than one-half cord.

Lake States pulpwood production for flakeboard plants in 1981, 1982, and 1983 was:

Species	Production		
	1981	1982	1983
Roundwood	(Thousand cords)		
Aspen	382	554	1,173
Other species	54	61	93
Residue	60	73	80
Total	496	688	1,346

Aspen continued to gain market share as the newer mills prefer aspen.

Pulpwood production for flakeboard nearly doubled because new plants were gearing up toward capacity and U.S. housing starts reached 1.7 million units, up 60 percent from the 36-year low set in 1982. New housing, including the furniture purchased for new homes, is a major consumer of flakeboard. Overall, furniture markets were strong in 1983.

During the next 2 years, massive increases in waferboard and OSB capacity are expected in the U.S. Two firms have major multi-plant programs.

Another waferboard plant is planned for Minnesota, and the first Lake States medium density fiberboard plant is planned for Michigan's Upper Peninsula. In addition, at least two pulpmills are increasing their capacity.

Demand for paper and paperboard in 1984 is high and demand for new housing is holding near the 1983 level. With these strong market forces nationally and new Lake States flakeboard plants able to operate closer to capacity, Lake States pulpwood output is likely to set another record in 1984.

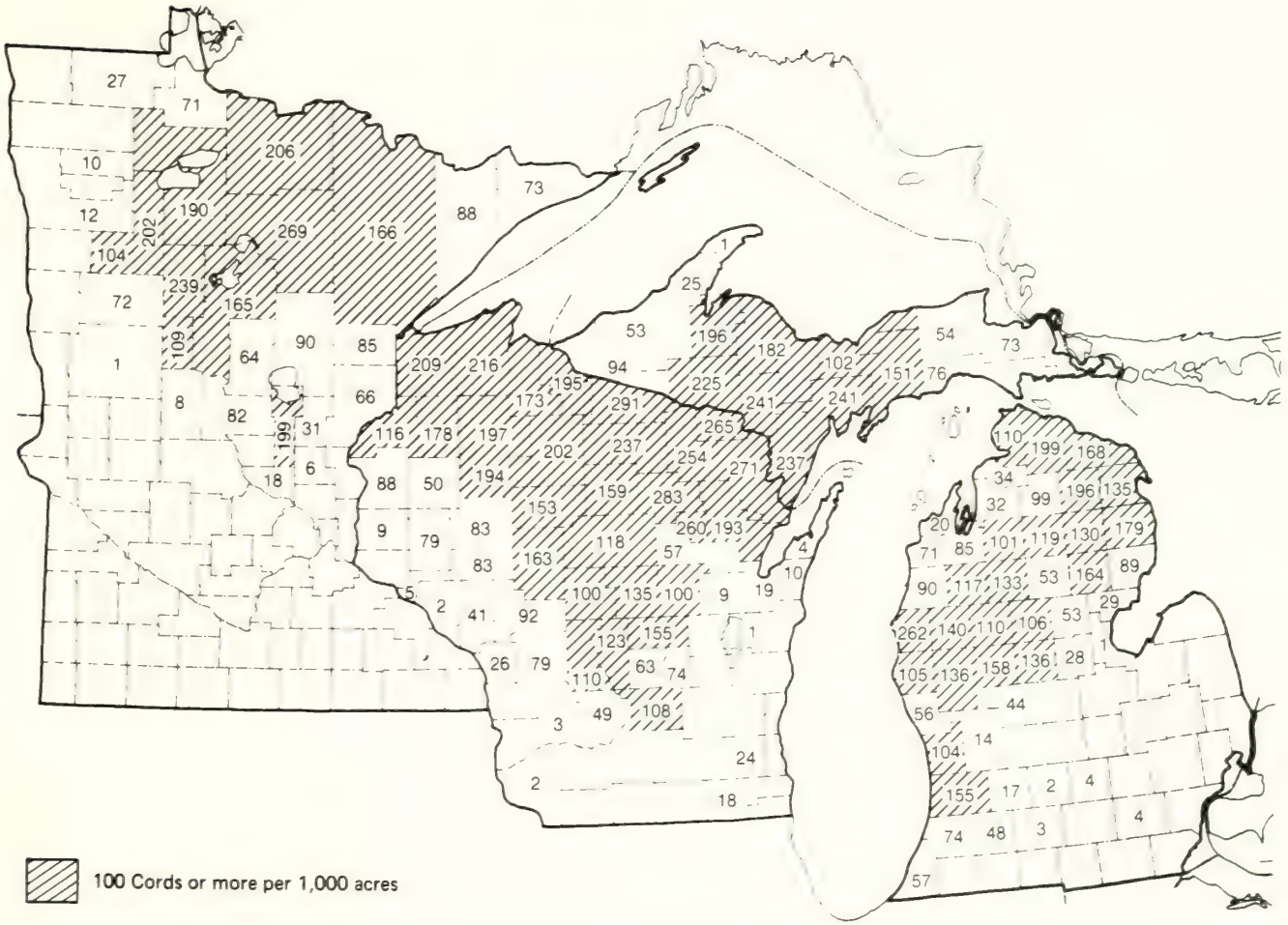


Figure 2.--*Cords of pulpwood cut per 1,000 acres of stocked commercial forest land in principal pulpwood-producing counties, 1983. Acres of stocked commercial forest land were determined during the last forest inventory in each State.*

Table 2.--Numbers of industrial plants in the Lake States using a particular species or residue for pulping and flakeboard in 1983

Species and kind of material	Total Lake States	Michigan	Minnesota	Wisconsin
Aspen	43	9	13	21
Balsam fir	17	3	5	9
Birch	22	7	2	13
Hemlock	8	1	-	7
Pine	11	5	2	4
Spruce	15	2	5	8
Tamarack	7	1	2	3
Maple	16	7	-	9
Oak	16	7	-	9
Other hardwoods	21	7	5	9
Softwood residue	12	2	2	8
Hardwood residue	20	7	2	11
Total plants[1/]	47	9	13	25

[1/] Some plants use more than one species, so numbers in columns are not additive.

Table 3.--Active woodpulp mills in the Lake States, by location, type of pulp produced, and average daily production, 1983

(In tons per 24 hours)[1/]

Company	Location	Average production				
		Total	Sulfite	Kraft	Groundwood and other mechanical	Semi-chemical
Michigan						
Abitibi-Price, Inc.	Alpena	430	--	--	430	--
Champion International	Ontonagon	440	--	--	--	440
Manistique Pulp and Paper Co.	Manistique	90	--	--	90	--
Mead Corp.	Escanaba	800	--	600	200	--
Menasha Corp.	Otsego	225	--	--	--	225
Packaging Corp. of America	Filer City	600	--	--	--	600
Warren Co., S.D.	Muskegon	250	--	250	--	--
Total	7 Mills	2,835	--	850	720	1,265
Minnesota						
Blandin Paper Co.	Grand Rapids	300	--	--	300	--
Hennepin Paper Co.	Little Falls	75	--	--	75	--
Boise Cascade Corp.	International Falls	920	--	380	540	--
Potlatch Corp.	Cloquet	475	--	475	--	--
Superwood Corp.	Bemidji	100	--	--	100	--
St. Regis Paper Co.	Sartell	385	--	--	385	--
Superwood Corp.	Duluth	350	--	--	350	--
Conwed Corp.	Cloquet	50	--	--	50	--
Certain-Teed Corp.	Shakopee	80	--	--	80	--
Total	9 Mills	2,735	--	855	1,880	--
Wisconsin						
James River Corp.	Green Bay	150	150	--	--	--
Weyerhaeuser Co.	Rothschild	200	200	--	--	--
Badger Paper Mills	Peshtigo	100	100	--	--	--
Appleton Papers Inc.	Combined Locks	200	--	--	200	--
Consolidated Papers, Inc.	Stevens Point	230	--	--	230	--
Consolidated Papers, Inc.	Wisconsin Rapids	750	--	450	300	--
Green Bay Packaging, Inc.	Green Bay	200	--	--	--	200
Flambeau Paper Co.	Park Falls	110	110	--	--	--
Midtec Paper Corp.	Kimberly	180	--	--	180	--
Pentair, Inc.	Niagara	210	--	--	210	--
Mosinee Paper Mills Co.	Mosinee	210	--	210	--	--
Nekoosa Papers, Inc.	Nekoosa	335	--	335	--	--
Nekoosa Papers, Inc.	Port Edwards	235	235	--	--	--
Owens-Illinois	Tomahawk	1,000	--	--	--	1,000
Procter and Gamble, Inc.	Green Bay	2/	2/	2/	2/	2/
Rhinelander Paper Co.	Rhinelander	75	75	--	--	--
Genstar Corp.	Cornell	100	--	--	100	--
Superior Fiber Products Co.	Superior	180	--	--	180	--
Thilmany Pulp and Paper Co.	Kaukauna	400	--	400	--	--
Tomahawk Pulp Co., Inc.	Tomahawk	50	--	--	50	--
Wausau Paper Mills Co.	Brokaw	185	185	--	--	--
Superwood Corp.	Phillips	100	--	--	100	--
Total	22 Mills	5,200	1,055	1,395	1,550	1,200
All states	38 Mills	10,770	1,055	3,100	4,150	2,465

[1/] Lockwood's Directory of the Paper and Allied Industries -- 1984.

[2/] Capacity not available.

CENTRAL STATES

Production

Pulpwood production climbed 26 percent to 448,000 cords (table 4), the highest output since 1979. About 7 out of 10 cords were residue from wood-using mills. Demand rose for roundwood in each species group and for Central States mill residue. For the fifth consecutive year, exports from the Central States (chiefly hardwood residue) reached a new high. Kentucky, Michigan, Wisconsin, and Ohio mills received 68 percent of the pulpwood produced.

Indiana, the leading producer, surpassed the previous peak output of 1979. Most of the gain came from hardwood residue, which accounted for more than four-fifths of Indiana's production. Output rose in the other Central States with Missouri having the largest increase. Illinois pulpwood production was the second lowest since 1959, and Iowa production was the second lowest since 1958.

Loggers harvested pulpwood in 21 Illinois counties, 19 Indiana counties, 18 Missouri counties, and 9 Iowa counties (fig. 3). Logging areas expanded in southeast

Table 4.--Production and imports of pulpwood, Central States, 1983

(In standard cords, unpeeled)[1/]

Species and destination	Production by States[2/]					Imports			Total receipts
	Illinois	Indiana	Iowa	Missouri	Regional total	Lake States	Other U.S.	Total imports	
Roundwood									
Softwoods									
Central States[3/]	302	--	--	--	302	--	--	--	302
Exported[4/]	17,899	--	--	1,384	19,283	--	--	--	--
Total	18,201	--	--	1,384	19,585	--	--	--	302
Soft hardwoods									
Central States[3/]	10,585	13,915	2,825	6,812	34,137	--	1,431	1,431	35,568
Exported[4/]	9,053	--	--	1,437	10,490	--	--	--	--
Total	19,638	13,915	2,825	8,249	44,627	--	1,431	1,431	35,568
Hard hardwoods									
Central States[3/]	4,377	13,842	4,684	8,807	31,710	--	1,424	1,424	33,134
Exported[4/]	14,806	13,302	--	13,275	41,383	--	--	--	--
Total	19,183	27,144	4,684	22,082	73,093	--	1,424	1,424	33,134
Total roundwood									
Central States[3/]	15,264	27,757	7,509	15,619	66,149	--	2,855	2,855	69,004
Exported[4/]	41,758	13,302	--	16,096	71,156	--	--	--	--
Total	57,022	41,059	7,509	31,715	137,305	--	2,855	2,855	69,004
Softwood residue									
Exported[4/]	3,395	--	5,562	2,237	11,194	--	--	--	--
Total	3,395	--	5,562	2,237	11,194	--	--	--	--
Hardwood residue									
Central States[3/]	15,779	34,061	3,420	23,446	76,706	--	2,438	2,438	79,144
Exported[4/]	14,730	151,051	--	56,543	222,324	--	--	--	--
Total	30,509	185,112	3,420	79,989	299,030	--	2,438	2,438	79,144
All wood material									
Central States[3/]	31,043	61,818	10,929	39,065	142,855	--	5,293	5,293	148,148
Exported[4/]	59,883	164,353	5,562	74,876	304,674	--	--	--	--
Total	90,926	226,171	16,491	113,941	447,529	--	5,293	5,293	148,148

[1/] Factors used in converting to standard green cords (128 cu. ft. including bark and air space) were:
4,500 pounds of soft hardwood roundwood;
5,000 pounds of hard hardwood or coniferous roundwood;
4,100 pounds of softwood chips (green);
4,400 pounds of hardwood chips (green);
2,500 pounds of chips (all species, dry).

[2/] Vertical columns of figures under box heading--Production by States--present the amount of pulpwood cut in each State.

[3/] Combined to prevent disclosure of individual mill receipts.

[4/] Pulpwood shipped to mills outside the region.

Iowa and west central Illinois and contracted in southwestern Indiana.

Receipts

Three Central States pulpmills received 148,000 cords compared to 106,000 cords in 1982. Despite the good recovery, receipts were the second lowest since 1958. Both roundwood and residue from wood-using mills contributed to the increase. Imports were only 5,000 cords.

Industry Trends and Analysis

Average daily pulp production remained at 470 tons (table 5). Most of the mills that closed during the last 6 years depended on some segment of the housing industry (including maintenance and repairs) for their finished products. Now only one of three active mills is dependent on housing. The other two produce corrugating medium, and their markets fluctuate more with general economic conditions.

In 1983, exports to other States climbed above 300,000 cords for the first time. Mills adjacent to the Central States are likely to continue procuring more than 3 out of every 5 cords of Central States pulpwood.

Except for the recessionary year 1982, pulpwood production has been more than 400,000 cords annually since 1969. As pulpmills closed in the Central States, mills in nearby States procured more Central States pulpwood. As a result, pulpwood production remained relatively steady during the last decade.

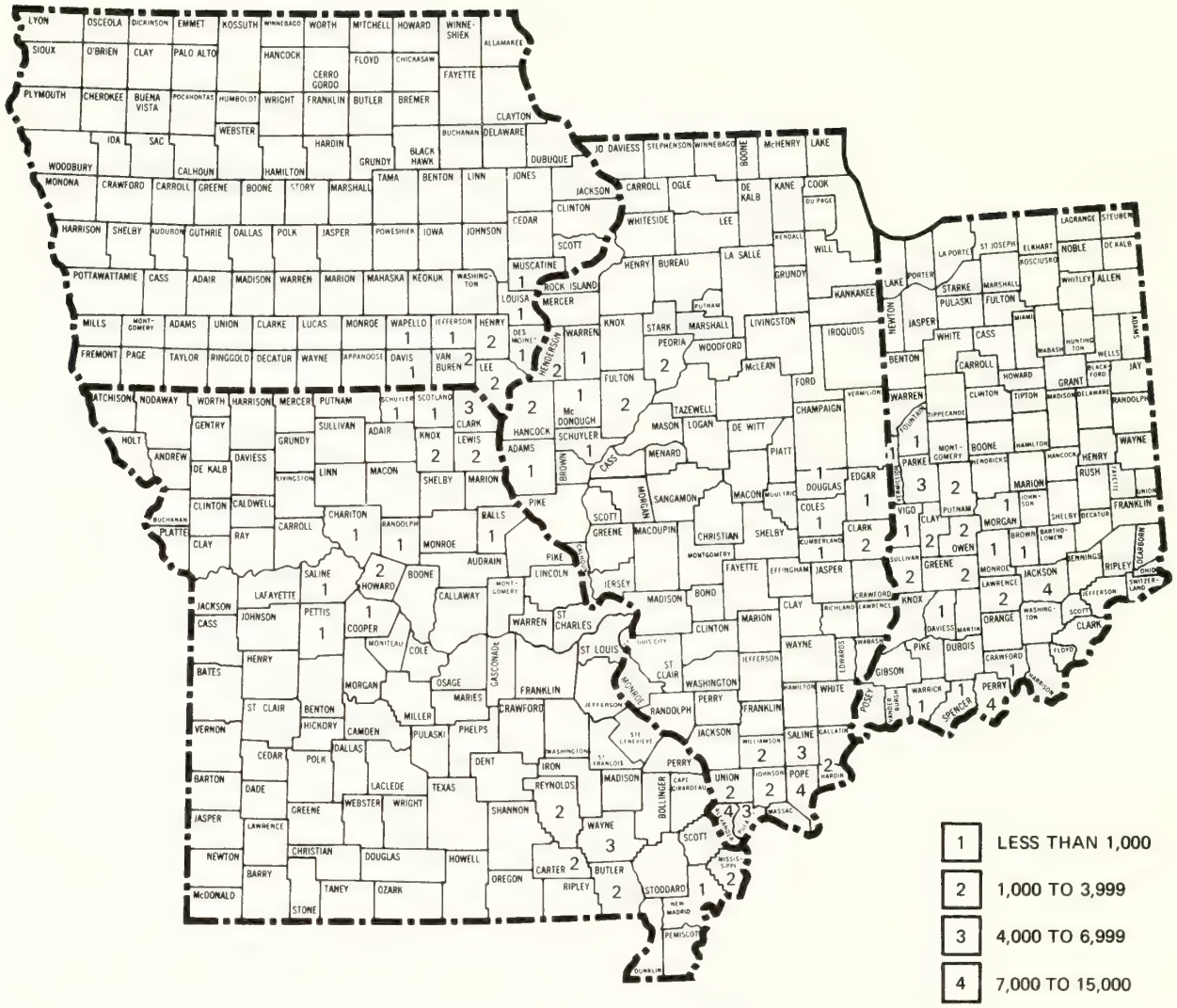


Figure 3.--*Production of pulpwood from roundwood (including chips from roundwood) in the Central States by counties, in standard cords, 1983.*

Table 5.--Active woodpulp mills in the Central States, by location, type of pulp produced, and average daily production, 1983

(In tons per 24 hours)[1/]

Company	Location	Average production				
		Total	Sulfite	Kraft	Groundwood and other mechanical	Semi-chemical
Illinois						
(no current operations)						
Total	0 Mills	--	--	--	--	--
Indiana						
Weston Paper and Mfg. Co.	Terre Haute	270	--	--	--	270
Total	1 Mill	270	--	--	--	270
Iowa						
Consolidated Packaging Corp.	Fort Madison	140	--	--	--	140
Total	1 Mill	140	--	--	--	140
Missouri						
Huebert Fibreboard, Inc.	Booneville	60	--	--	60	--
Total	1 Mill	60	--	--	60	--
All states	3 Mills	470	--	--	60	410

[1/] Lockwood's Directory of the Paper and Allied Industries -- 1984.

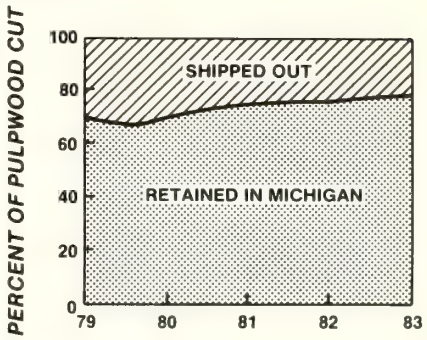
APPENDIX

Table 6.--Lake States pulpwood production by State of origin and destination, 1979-1983

(In thousand standard cords, unpeeled)

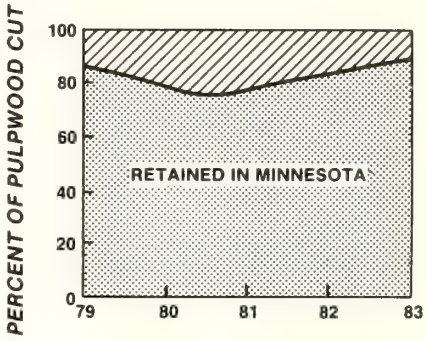
MICHIGAN

	Total cut	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
1979	1,981	1/	516	1,428	37
1980	1,969	-	490	1,443	36
1981	1,838	-	419	1,402	17
1982	1,751	-	396	1,340	15
1983	2,157	-	391	1,747	19
5-year average	1,939	1/	442	1,472	25



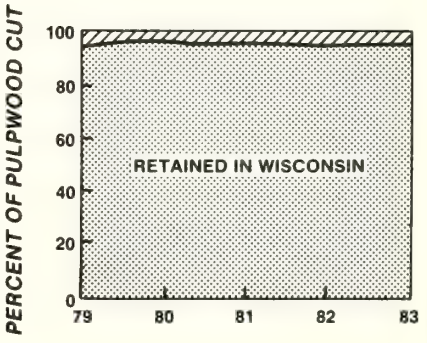
MINNESOTA

	Total cut	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
1979	1,458	1,226	169	-	63
1980	1,333	1,044	216	-	73
1981	1,371	1,119	177	-	75
1982	1,484	1,264	179	-	41
1983	1,910	1,720	155	-	35
5-year average	1,511	1,275	179	-	57



WISCONSIN

	Total cut	Destination of pulpwood			
		Minnesota	Wisconsin	Michigan	Other
1979	2,109	20	2,024	47	18
1980	2,362	18	2,297	35	12
1981	2,389	34	2,320	26	9
1982	2,286	27	2,231	28	-
1983	2,475	53	2,399	23	-
5-year average	2,324	30	2,254	32	9



1/ Less than 500 cords.

Table 7.--Lake States pulpwood production by Forest Survey Unit and destination by State, 1983

(In hundred standard cords, unpeeled)

Unit	Total cut	Destination of pulpwood			
		Michigan	Minnesota	Wisconsin	Other
MICHIGAN					
Roundwood					
E. Upper Peninsula	5,000	3,991	--	870	139
W. Upper Peninsula	6,196	3,657	--	2,538	1
N. Lower Peninsula	8,017	7,882	--	82	53
S. Lower Peninsula	632	632	--	--	--
Total	19,845	16,162	--	3,490	193
Residue	1,731	1,309	--	422	--
Total pulpwood	21,576	17,471	--	3,912	193
MINNESOTA					
Roundwood					
Aspen-Birch	8,026	--	7,042	659	325
Northern Pine	9,421	--	8,687	734	--
Central Hardwood	702	--	630	72	--
Prairie	11	--	8	3	--
Total	18,160	--	16,367	1,468	325
Residue	939	--	830	88	21
Total pulpwood	19,099	--	17,197	1,556	346
WISCONSIN					
Roundwood					
Northeastern	9,511	28	--	9,483	--
Northwestern	9,252	31	530	8,691	--
Central	2,994	--	--	2,994	--
Southwestern	262	--	--	262	--
Southeastern	142	--	--	142	--
Total	22,161	59	530	21,572	--
Residue	2,584	168	--	2,416	--
Total pulpwood	24,745	227	530	23,988	--

Table 8.--Lake States pulpwood production[1/] from roundwood by species, State, and Forest Survey Unit, 1979-1983.

(In thousand standard cords, unpeeled)

MICHIGAN

Unit	Aspen					Balsam fir					Pine					Spruce				
	Annual production					Annual production					Annual production					Annual production				
	1979	1980	1981	1982	1983	1979	1980	1981	1982	1983	1979	1980	1981	1982	1983	1979	1980	1981	1982	1983
Eastern Upper Peninsula	125	116	89	93	109	43	57	57	56	59	119	70	56	77	95	21	34	24	33	45
Western Upper Peninsula	204	209	201	210	242	41	46	42	45	36	48	53	45	52	52	17	23	19	34	31
Northern Lower Peninsula	375	374	350	315	523	1	6	5	4	6	166	124	118	118	102	1	1	2	1	1
Southern Lower Peninsula	5	6	12	14	15	--	--	--	--	--	17	21	18	15	8	--	--	--	--	--
Total	709	705	652	632	889	85	109	104	105	101	350	268	237	262	257	39	58	45	68	77

MINNESOTA

Aspen-Birch	392	313	352	308	563	72	73	69	68	51	75	66	71	92	68	119	127	93	98	66
Northern Pine	404	357	422	504	766	46	38	31	38	39	75	76	70	80	67	34	43	34	36	29
Central Hardwood	41	29	27	54	62	(1/)	--	--	(1/)	--	8	9	6	7	5	(1/)	(1/)	(1/)	--	(1/)
Prairie	1	(1/)	(1/)	--	1	--	--	--	--	--	--	--	(1/)	(1/)	--	--	(1/)	(1/)	--	--
Total	838	699	801	866	1,392	118	111	100	106	90	158	151	147	179	140	153	170	127	134	95

WISCONSIN

Northeastern	364	459	415	392	451	60	66	79	70	61	95	95	111	156	114	14	27	22	23	21
Northwestern	319	326	469	420	481	23	35	25	32	22	113	113	131	141	125	4	5	5	5	7
Central	66	85	79	71	91	1	1	1	1	2	127	149	150	166	137	(1/)	1	(1/)	(1/)	(1/)
Southwestern	1	1	1	(1/)	(1/)	--	--	(1/)	(1/)	--	20	22	20	23	25	--	(1/)	(1/)	(1/)	(1/)
Southeastern	1	2	1	1	2	--	--	--	(1/)	--	6	8	7	8	11	1	(1/)	--	--	(1/)
Total	751	873	965	884	1,025	84	102	105	103	85	361	387	419	494	412	19	33	27	28	28
Lake States	2,298	2,277	2,418	2,382	3,306	287	322	309	314	276	869	806	803	935	809	211	261	199	230	200

1/ Less than 500 cords.
2/ Includes small quantity of cedar not shown in other parts of table.

(Table 8 continued)

MICHIGAN

Unit	Tamarack					Other hardwoods					Birch					Hemlock				
	Annual production					Annual production					Annual production					Annual production				
	1979	1980	1981	1982	1983	1979	1980	1981	1982	1983	1979	1980	1981	1982	1983	1979	1980	1981	1982	1983
Eastern Upper Peninsula	1	3	3	3	4	83	124	119	97	106	35	29	36	31	40	26	32	23	30	27
Western Upper Peninsula	1	3	3	7	3	174	163	143	135	161	53	40	44	38	64	19	26	16	26	21
Northern Lower Peninsula	--	--	--	--	--	194	206	194	128	144	21	34	25	19	26	--	(1/)	(1/)	(1/)	--
Southern Lower Peninsula	--	--	--	--	--	5	8	17	36	40	(1/)	(1/)	(1/)	1	(1/)	--	--	--	--	--
Total	2	6	6	10	7	456	501	473	396	451	109	103	105	89	130	45	58	39	56	48
MINNESOTA																				
Aspen-Birch	18	22	11	24	12	18	30	31	27	40	3	11	9	1	3	--	--	--	--	--
Northern Pine	16	18	18	20	14	9	16	19	28	26	1	4	2	2	1	--	--	--	--	--
Central Hardwood	(1/)	(1/)	(1/)	(1/)	(1/)	4	2	3	4	3	3	(1/)	(1/)	(1/)	(1/)	--	--	--	--	--
Prairie	2	3	1	(1/)	(1/)	--	(1/)	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	36	43	30	44	26	31	48	53	59	69	7	15	11	3	4	--	--	--	--	--
WISCONSIN																				
Northeastern	1	2	1	2	2	150	181	154	134	190	76	91	74	69	83	26	26	24	29	29
Northwestern	1	1	3	4	3	165	186	160	152	175	63	80	73	74	103	13	6	4	4	9
Central	(1/)	(1/)	1	1	1	121	82	70	53	56	11	15	12	11	12	1	2	1	(1/)	2
Southwestern	--	--	--	(1/)	--	4	4	3	(1/)	(1/)	(1/)	(1/)	(1/)	(1/)	(1/)	--	--	--	--	--
Southeastern	--	--	--	--	--	1	2	2	1	1	1	(1/)	(1/)	(1/)	(1/)	--	--	--	--	--
Total	2	3	5	7	6	441	455	389	340	422	151	186	159	154	198	40	34	29	33	40
Lake States	40	52	41	61	39	928	1,004	915	795	942	267	304	275	246	332	85	92	68	89	88

(Table 8 continued on next page)

(Table 8 continued)

Unit	All species[2/] Annual production				
	1979	1980	1981	1982	1983
MICHIGAN					
Eastern Upper Peninsula	457	469	414	425	500
Western Upper Peninsula	561	566	517	554	619
Northern Lower Peninsula	759	745	693	585	802
Southern Lower Peninsula	27	35	48	66	63
Total	1,804	1,815	1,672	1,630	1,984
MINNESOTA					
Aspen-Birch	696	642	635	618	803
Northern Pine	585	552	597	708	942
Central Hardwood	56	40	36	65	70
Prairie	3	3	2	(1/)	1
Total	1,340	1,237	1,270	1,391	1,816
WISCONSIN					
Northeastern	786	947	880	875	951
Northwestern	701	752	870	832	925
Central	327	335	315	303	300
Southwestern	25	27	24	23	26
Southeastern	10	12	9	10	14
Total	1,849	2,073	2,098	2,043	2,216
Lake States	4,993	5,125	5,040	5,064	6,016

Table 9.--Lake States pulpwood production from roundwood by county and species group, 1983

(In standard cords, unpeeled)

MICHIGAN

Unit and County[1/]	All species	Species group										
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
E. Upper Peninsula												
Alger	49,477	1,098	3,968	4,744	3,685	2,599	943	3,403	187	254	9,338	2,498
Chippewa	51,295	1,420	3,936	1,762	13,325	4,462	993	4,300	188	144	11,982	901
Delta	138,357	4,791	18,560	4,995	11,954	12,800	2,908	13,046	1,926	578	25,726	6,115
Luce	25,039	465	3,815	2,754	4,109	537	265	4,957	385	65	2,620	633
Mackinac	39,310	772	5,202	1,191	1,268	1,569	451	3,994	120	197	12,258	1,196
Menominee	116,384	2,683	16,930	7,854	2,839	2,027	1,703	9,355	660	685	36,862	6,284
Schoolcraft	80,061	2,593	6,665	4,163	17,045	7,596	1,773	6,183	281	295	10,430	2,848
Total	499,923	13,822	59,076	27,463	54,225	31,590	9,036	45,238	3,747	2,218	109,216	20,475
W. Upper Peninsula												
Baraga	100,118	1,972	1,968	6,445	4,387	291	479	1,708	173	195	46,658	--
Dickinson	90,206	1,096	7,527	1,677	1,845	2,221	591	5,163	851	286	46,815	4,454
Gogebic	57,943	7	190	1,259	96	3,013	5	429	1	704	26,833	--
Houghton	12,492	36	367	323	1,992	446	18	277	7	412	1,460	--
Iron	146,953	1,116	9,124	2,543	2,034	1,607	933	8,470	980	555	65,975	--
Keweenaw	152	--	23	66	--	--	--	27	--	--	--	--
Marquette	175,938	5,530	17,170	7,677	19,499	8,399	3,884	14,737	978	675	38,110	8,814
Ontonagon	35,769	--	103	986	--	22	--	596	110	156	15,972	--
Total	619,571	9,757	36,472	20,976	29,853	15,999	5,910	31,407	3,100	2,983	241,823	13,268
N. Lower Peninsula												
Alcona	54,307	--	20	--	643	435	18	--	--	572	38,859	1,496
Alpena	28,308	--	83	--	380	12	--	10	--	415	20,702	1,001
Antrim	4,866	--	--	--	252	252	10	--	--	5	3,435	--
Arenac	2,699	--	--	--	--	--	--	--	--	67	1,954	4
Bay	21	--	--	--	--	--	--	--	--	--	21	--
Benzie	8,572	--	--	--	--	--	--	--	--	104	4,005	--
Charlevoix	4,652	--	--	--	12	12	--	--	--	78	3,415	19
Cheboygan	72,304	--	1,188	--	2,263	270	--	291	--	401	51,275	499
Clare	22,861	--	--	--	732	--	--	--	--	3	21,389	--
Crawford	32,571	--	20	--	5,712	2,539	103	1	--	36	19,002	81
Emmet	21,437	--	--	--	73	1,584	--	--	--	14	16,721	14
Gladwin	10,058	--	--	--	22	--	--	--	--	55	9,093	--
Grand Traverse	12,984	--	--	--	589	589	25	--	--	104	9,510	--
Iosco	20,109	--	33	--	5,142	3,042	100	--	--	60	8,271	304
Isabella	10,188	--	--	--	-	--	--	--	--	52	9,399	--
Kalkaska	24,728	--	--	--	4,244	3,698	151	--	--	140	13,171	--
Lake	41,920	--	--	--	3,945	3,945	162	--	--	478	21,597	--
Leelanau	1,499	--	--	--	5	5	--	--	--	--	1,281	--
Manistee	19,573	--	--	--	--	1,103	--	--	--	218	8,319	--
Mason	38,195	--	--	--	--	1,278	--	--	--	195	25,973	--
Mecosta	18,926	--	--	--	--	349	--	--	--	19	16,459	--
Midland	4,112	--	--	--	--	--	--	--	--	42	3,810	--
Missaukee	27,071	--	--	--	204	204	8	--	--	136	22,599	4
Montmorency	56,787	--	1,637	--	2,687	245	11	--	--	962	38,963	883
Newaygo	42,145	--	--	--	5,963	5,963	243	--	--	41	23,621	--
Oceana	15,065	--	--	--	658	1,534	--	--	--	21	9,767	--
Ogemaw	35,734	--	--	--	6,375	3,928	160	--	--	175	18,473	185
Osceola	17,332	--	--	--	--	94	--	--	--	9	14,553	--
Oscoda	39,785	--	--	--	5,926	3,800	145	--	--	151	24,016	406
Otsego	25,838	--	--	--	9,541	1,410	54	--	--	107	9,650	87
Presque Isle	44,882	--	2,773	--	3,637	--	--	685	--	393	28,036	827
Roscommon	13,119	--	--	--	821	522	21	--	--	14	10,222	52
Wexford	29,102	--	--	--	2,180	2,180	89	--	--	127	15,827	1
Total	801,750	--	5,754	--	62,006	38,993	1,300	987	--	5,194	523,388	5,863
S. Lower Peninsula												
Allegan	21,207	--	--	--	367	367	16	--	--	407	4,343	--
Barry	1,859	--	--	--	--	138	--	--	--	8	1,143	--
Berrien	3,742	--	--	--	--	--	--	--	--	31	493	--
Calhoun	214	--	--	--	--	192	--	--	--	--	7	--
Eaton	73	--	--	--	--	73	--	--	--	--	--	--
Ingham	176	--	--	--	--	31	--	--	--	--	145	--
Kalamazoo	3,198	--	--	--	--	15	--	--	--	35	543	--
Kent	1,748	--	--	--	--	306	--	--	--	13	449	--
Montcalm	6,150	--	--	--	--	120	--	--	--	31	3,059	--
Muskegon	8,939	--	--	--	358	1431	--	--	--	38	2,241	--
Ottawa	8,081	--	--	--	--	4206	--	--	--	21	957	--
Van Buren	7,533	--	--	--	--	--	--	--	--	74	1,172	--
Washtenaw	247	--	--	--	--	--	--	--	--	--	--	--
Total	63,167	--	--	--	725	6,879	16	--	--	658	14,552	--
State total	1,984,411	23,579	101,302	48,439	146,809	93,461	16,262	77,632	6,847	11,053	888,979	39,606

(Table 9 continued on next page)

(Table 9 continued)

MICHIGAN

Unit and County[1/]	Species group											
	Basswood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
E. Upper Peninsula												
Alger	1,031	1,707	3,157	1,730	--	1,468	--	3,675	3,309	298	18	367
Chippewa	466	824	1,665	751	--	417	--	1,866	1,734	75	--	84
Delta	2,513	3,361	7,260	4,293	--	2,434	--	6,782	7,721	97	32	465
Luce	312	432	854	533	--	479	--	823	889	53	--	59
Mackinac	617	1,110	1,929	994	--	883	--	2,539	2,811	99	--	110
Menominee	1,849	2,167	8,122	2,749	--	843	--	7,186	4,465	574	90	457
Schoolcraft	1,424	1,941	3,871	2,384	--	2,185	--	3,726	4,335	44	15	264
Total	8,212	11,542	26,858	13,434	--	8,709	--	26,597	25,264	1,240	155	1,806
W. Upper Peninsula												
Baraga	770	--	15,805	2,833	--	4,083	--	7,878	3,946	162	8	357
Dickinson	1,249	--	7,797	727	--	1,011	--	2,719	3,701	177	8	291
Gogebic	2,249	--	925	3,166	--	4,401	--	13,394	673	351	9	238
Houghton	60	--	787	719	--	1,952	--	2,885	674	58	--	19
Iron	583	--	6,222	5,291	--	11,714	--	20,050	8,350	364	78	964
Keweenaw	--	--	--	--	--	--	--	10	16	10	--	--
Marquette	3,350	4,300	11,266	5,297	--	4,972	--	9,837	9,861	730	34	818
Ontonagon	1,861	--	623	1,860	--	2,397	--	5,945	4,894	140	-	104
Total	10,122	4,300	43,425	19,893	--	30,530	--	62,718	32,115	1,992	137	2,791
N. Lower Peninsula												
Alcona	56	86	2,525	--	--	--	--	144	2,796	6,042	615	--
Alpena	39	52	1,659	--	--	--	--	151	1,677	1,906	219	2
Antrim	104	--	5	--	--	--	--	7	326	416	54	--
Arenac	--	--	121	--	--	--	--	32	380	140	1	--
Bay	--	--	--	--	--	--	--	--	--	--	--	--
Benzie	52	52	168	--	--	--	--	520	2,080	1,040	520	31
Charlevoix	8	11	433	--	--	--	--	47	573	44	--	--
Cheboygan	101	99	4,275	10	--	--	--	87	7,627	3,910	7	1
Clare	--	--	272	--	--	--	--	4	127	282	52	--
Crawford	53	114	860	--	--	--	--	4	1,832	1,676	501	37
Emmet	--	3	181	--	--	--	--	717	1,929	201	--	--
Gladwin	--	--	312	--	52	--	--	3	252	199	70	--
Grand Traverse	104	104	104	--	--	--	--	104	832	728	104	87
Iosco	6	8	580	--	--	--	--	16	654	1,708	185	--
Isabella	--	--	165	--	--	--	--	6	293	225	48	--
Kalkaska	208	124	632	65	--	--	--	78	1,405	620	83	109
Lake	208	208	483	--	--	--	--	577	3,698	4,429	1,878	312
Leelanau	--	41	63	--	--	--	--	52	52	--	--	--
Manistee	208	224	375	--	--	--	--	266	2,179	4,307	2,174	200
Mason	436	168	1,109	--	--	--	--	373	3,870	3,534	1,117	142
Mecosta	--	--	165	--	--	--	--	27	756	955	196	--
Midland	--	--	104	--	126	--	--	--	14	13	3	--
Missaukee	108	111	629	--	--	--	--	363	2,164	451	41	49
Montmorency	488	313	1,883	--	--	--	--	90	4,211	3,887	427	100
Newaygo	33	--	133	--	--	--	--	96	974	3,296	1,782	--
Oceana	--	--	280	--	--	--	--	48	994	1,304	459	--
Ogemaw	38	45	1,215	--	52	--	--	68	2,040	2,675	305	--
Osceola	--	--	253	--	--	--	--	222	680	1,020	501	--
Oscoda	29	27	1,025	2	--	--	--	24	1,333	2,514	363	24
Otsego	251	157	979	38	--	--	--	2	1,991	1,496	26	49
Presque Isle	40	59	3,262	--	--	--	--	98	3,244	1,646	182	--
Roscommon	1	1	408	1	--	--	--	52	446	297	234	27
Wexford	109	118	846	4	--	--	--	712	4,649	1,546	592	122
Total	2,680	2,125	25,504	120	230	--	--	4,990	56,078	52,507	12,739	1,292
S. Lower Peninsula												
Allegan	213	178	195	--	985	197	355	359	4,185	4,579	4,461	--
Barry	4	3	7	--	--	4	6	12	100	296	138	--
Berrien	33	27	30	--	366	31	54	54	1,053	785	785	--
Calhoun	--	--	--	--	--	--	--	1	2	10	2	--
Eaton	--	--	--	--	--	--	--	--	--	--	--	--
Ingham	--	--	--	--	--	--	--	--	--	--	--	--
Kalamazoo	36	30	33	--	168	34	61	61	671	755	756	--
Kent	14	12	13	--	--	--	--	--	316	341	284	--
Montcalm	--	--	31	--	--	--	--	41	450	1,779	639	--
Muskegon	--	--	38	--	--	--	--	50	533	2,914	1,336	--
Ottawa	8	7	20	--	--	8	14	31	406	895	457	1,051
Van Buren	78	65	70	--	362	72	130	130	2,614	1302	1,302	162
Washtenaw	--	--	--	--	--	--	--	--	--	--	--	247
Total	386	322	437	--	1,881	346	620	739	10,330	13,656	10,160	1,460
State total	21,400	18,289	96,224	33,447	2,111	39,585	620	95,044	123,787	69,395	23,191	7,349

(Table 9 continued on next page)

(Table 9 continued)

MINNESOTA

Unit and County[1/]	All species	Species group: Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Aspen-Birch												
Carlton	26,321	--	194	--	1,029	655	187	564	--	--	21,700	1,808
Cook	38,882	--	2,597	--	1,575	108	194	7,751	--	--	26,657	--
Koochiching	260,741	--	17,758	--	11,689	4,171	2,399	24,018	9,328	--	175,929	14,853
Lake	74,523	--	5,297	--	1,553	1,237	1,969	13,521	1,614	--	47,514	767
St. Louis	402,058	--	24,827	--	26,383	8,124	7,190	20,071	842	55	291,071	21,878
Total	802,525	--	50,673	--	42,229	14,295	11,939	65,925	11,784	55	562,871	39,306
Northern Pine												
Aitkin	60,278	--	751	--	129	82	23	508	1,418	--	52,345	5,022
Becker	22,756	--	--	--	1,610	182	54	--	--	--	19,575	1,335
Beltrami	147,880	--	6,386	--	5,396	1,144	229	6,348	5,111	176	118,619	3,756
Cass	140,988	--	2,397	--	12,206	1,922	240	844	1,239	64	118,862	2,821
Clearwater	60,696	--	806	--	1,294	364	69	1,375	1,005	--	54,016	1,669
Crow Wing	23,484	--	--	--	5,180	560	--	--	--	--	17,744	--
Hubbard	95,304	--	347	--	4,035	694	229	296	165	--	86,033	3,505
Itasca	338,405	--	28,300	--	8,100	2,875	985	10,797	2,447	21	278,657	6,150
Lake of the Woods	24,388	--	415	--	10,500	--	--	6,797	1,517	--	4,952	207
Mahnomen	11,060	--	--	--	--	--	--	--	240	--	10,654	166
Roseau	5,098	--	90	--	1,475	--	--	1,988	548	--	891	106
Wadena	11,710	--	--	--	6,600	925	160	--	--	--	3,942	83
Total	942,047	--	39,492	--	56,525	8,748	1,989	28,953	13,690	261	766,290	24,820
Central Harwood												
Isanti	255	--	--	--	--	255	--	--	--	--	--	--
Kanabec	3,997	--	--	--	--	--	--	--	--	--	3,997	--
Mille Lacs	24,052	--	--	--	167	19	--	--	30	--	23,836	--
Morrison	12,020	--	--	--	167	19	--	26	--	--	11,808	--
Otter Tail	204	--	--	--	--	--	--	--	204	--	--	--
Pine	27,832	--	--	--	1,569	1,081	296	--	85	--	21,293	3,414
Sherburne	985	--	--	--	179	755	1	50	--	--	--	--
Todd	825	--	--	--	167	19	--	--	--	--	639	--
Winona	12	--	--	--	--	12	--	--	--	--	--	--
Total	70,182	--	--	--	2,249	2,160	297	76	319	--	61,573	3,414
Prairie												
Pennington	312	--	--	--	--	--	--	--	--	--	312	--
Polk	787	--	--	--	--	--	--	--	267	--	520	--
Total	1,099	--	--	--	--	--	--	--	267	--	832	--
State total	1,815,853	--	90,165	--	101,003	25,203	14,225	94,954	26,060	316	1,391,566	67,540

(Table 9 continued on next page)

(Table 9 continued)

MINNESOTA

Unit and County[1/]	Species group											
	Basswood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Aspen-Birch												
Carlton	--	--	184	--	--	--	--	--	--	--	--	--
Cook	--	--	--	--	--	--	--	--	--	--	--	--
Koochiching	--	--	416	--	--	--	--	104	76	--	--	--
Lake	--	--	1,051	--	--	--	--	--	--	--	--	--
St. Louis	--	--	1,513	--	--	--	--	104	--	--	--	--
Total	--	--	3,164	--	--	--	--	208	76	--	--	--
Northern Pine												
Aitkin	--	--	--	--	--	--	--	--	--	--	--	--
Becker	--	--	--	--	--	--	--	--	--	--	--	--
Beltrami	--	--	442	42	--	89	--	131	11	--	--	--
Cass	--	--	305	--	--	48	--	19	21	--	--	--
Clearwater	--	--	56	--	--	--	--	21	21	--	--	--
Crow Wing	--	--	--	--	--	--	--	--	--	--	--	--
Hubbard	--	--	--	--	--	--	--	--	--	--	--	--
Itasca	--	--	52	--	--	--	--	21	--	--	--	--
Lake of the Woods	--	--	--	--	--	--	--	--	--	--	--	--
Mahnomen	--	--	--	--	--	--	--	--	--	--	--	--
Roseau	--	--	--	--	--	--	--	--	--	--	--	--
Wadena	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	855	42	--	137	--	192	53	--	--	--
Central Hardwood												
Isanti	--	--	--	--	--	--	--	--	--	--	--	--
Kanabec	--	--	--	--	--	--	--	--	--	--	--	--
Mille Lacs	--	--	--	--	--	--	--	--	--	--	--	--
Morrison	--	--	--	--	--	--	--	--	--	--	--	--
Otter Tail	--	--	--	--	--	--	--	--	--	--	--	--
Pine	--	--	94	--	--	--	--	--	--	--	--	--
Sherburne	--	--	--	--	--	--	--	--	--	--	--	--
Todd	--	--	--	--	--	--	--	--	--	--	--	--
Winona	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	94	--	--	--	--	--	--	--	--	--
Prairie												
Pennington	--	--	--	--	--	--	--	--	--	--	--	--
Polk	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--	--
State total	--	--	4,113	42	--	137	--	400	129	--	--	--

(Table 9 continued on next page)

(Table 9 continued)

WISCONSIN

Unit and County[1/]	All species	Species group										
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar
Northeastern												
Florence	68,513	259	6,531	1,580	1,642	1,925	373	1,910	66	747	40,168	26
Forest	131,524	26	11,974	3,108	268	4,370	58	6,800	238	4,913	45,863	26
Langlade	106,927	--	4,363	700	329	1,367	14	760	166	3,667	50,037	--
Lincoln	62,650	--	3,421	557	1,609	2,599	134	947	394	2,013	33,959	--
Marinette	173,629	18	13,720	1,027	11,862	11,079	451	3,874	486	1,569	106,154	208
Menominee	56,000	--	--	17,757	4,968	441	2,397	35	--	480	17,195	--
Oconto	67,583	--	1,440	784	4,461	5,747	246	116	161	882	46,506	--
Oneida	132,952	--	8,718	907	5,305	7,781	1,480	3,772	501	3,280	58,005	--
Shawano	27,561	--	43	1,050	719	5,600	200	50	167	883	9,771	--
Vilas	123,788	--	10,677	1,800	15,688	12,427	8,101	2,780	12	1,002	43,178	--
Total	951,127	303	60,887	29,270	46,851	53,336	13,454	21,044	2,191	19,436	450,836	260
Northwestern												
Ashland	88,532	--	7,973	191	2,001	3,836	342	2,368	782	2,598	41,887	--
Barron	7,446	--	--	11	1,208	725	45	--	--	19	4,594	--
Bayfield	162,801	--	2,012	31	19,792	4,713	1,030	66	19	707	108,571	602
Burnett	36,188	--	49	--	10,424	3,083	73	17	--	27	21,644	--
Douglas	124,893	--	2,169	51	42,995	4,365	546	102	11	601	62,827	602
Iron	71,938	--	1,056	7,730	217	811	424	798	212	2,247	31,338	--
Polk	18,909	--	--	--	2,614	193	--	--	--	85	6,482	--
Price	118,630	--	2,971	431	856	2,703	9	1,050	942	7,499	45,010	--
Rusk	62,437	--	565	432	14	801	33	--	7	3,661	31,719	--
Sawyer	118,917	--	3,158	243	1,551	3,031	6	1,621	637	3,695	68,628	--
Taylor	54,715	--	1,269	319	27	826	10	228	378	2,081	21,766	--
Washburn	59,785	--	984	12	11,379	4,147	180	106	--	513	37,135	--
Total	925,191	--	22,206	9,451	93,078	29,234	2,698	6,356	2,988	23,733	481,601	1,204
Central												
Adams	30,041	--	--	--	13,658	10,971	1,855	--	52	85	669	--
Chippewa	16,925	--	29	36	334	298	--	--	--	734	9,206	--
Clark	43,397	--	50	96	530	2,833	20	--	--	851	23,475	--
Eau Claire	12,580	--	14	44	4,261	4,180	87	--	--	23	1,931	--
Jackson	30,955	--	--	--	1,478	19,942	--	--	--	--	4,513	--
Juneau	25,666	--	--	--	15,421	1,283	419	--	--	60	2,963	--
Marathon	42,862	--	1,396	1,011	1,525	2,099	204	169	29	421	29,557	--
Marquette	5,956	--	29	--	73	2,802	131	--	31	2	401	--
Monroe	16,391	--	--	53	9,483	3,783	131	4	--	51	509	--
Portage	20,748	--	147	345	1,599	5,107	1,842	59	640	383	6,015	--
Waupaca	15,502	--	57	122	68	6,723	465	15	--	567	3,543	--
Waushara	17,621	--	--	--	4,083	12,321	1,111	--	10	--	26	--
Wood	20,792	--	--	10	1,493	2,797	1,337	27	--	485	7,929	--
Total	299,436	--	1,722	1,717	54,006	75,139	7,602	274	762	3,662	90,737	--
Southwestern												
Buffalo	378	--	--	--	20	306	14	--	--	--	38	--
Dunn	10,574	--	--	--	3,230	6,560	500	--	--	--	118	--
Grant	338	--	--	--	15	323	--	--	--	--	--	--
Iowa	10	--	--	--	--	--	--	--	--	1	--	--
La Crosse	2,404	--	--	--	1,685	538	66	--	--	--	--	--
Pepin	233	--	--	--	23	114	--	--	--	--	--	--
Pierce	16	--	--	--	16	--	--	--	--	--	--	--
Richland	257	--	--	--	22	215	20	--	--	--	--	--
St. Croix	435	--	--	--	68	367	--	--	--	--	--	--
Sauk	7,243	--	--	--	1,820	4,897	494	--	--	2	--	--
Trempealeau	4,294	--	--	--	206	3,605	394	64	--	--	2	--
Total	26,182	--	--	--	7,105	16,925	1,488	64	--	3	158	--
Southeastern												
Brown	696	--	--	--	--	72	--	--	--	--	624	--
Calumet	21	--	--	--	--	21	--	--	--	--	--	--
Columbia	8,654	--	--	--	917	5,878	769	--	--	2	14	--
Door	416	--	--	--	--	--	--	--	--	--	416	--
Green Lake	2,004	--	--	--	199	1,635	170	--	--	--	--	--
Kewaunee	312	--	--	--	--	--	--	--	--	--	312	--
Manitowoc	12	--	--	--	--	--	--	--	--	--	12	--
Outagamie	599	--	--	--	--	121	29	--	--	--	420	--
Walworth	443	--	--	--	10	21	391	21	--	--	--	--
Waukesha	1,039	--	--	--	--	782	257	--	--	--	--	--
Total	14,196	--	--	--	1,126	8,530	1,616	21	--	2	1,798	--
State total	2,216,132	303	84,815	40,438	202,166	183,164	26,858	27,759	5941	46,836	1,025,130	1,464

(Table 9 continued on next page)

(Table 9 continued)

WISCONSIN

Unit and County[1/]	Species group											
	Basswood	Beech	White birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
Northeastern												
Florence	42	--	3,157	790	--	1,566	--	4,407	1,965	865	220	274
Forest	1,600	39	11,528	3,533	--	4,891	--	22,312	6,779	1,191	276	1,731
Langlade	1,613	--	9,159	2,593	--	4,726	--	18,563	6,474	1,081	35	1,280
Lincoln	1,177	--	4,748	673	--	1,466	--	4,454	3,229	895	--	375
Marinette	197	290	6,291	347	--	1,971	--	5,342	4,963	3,032	557	191
Menominee	--	432	569	768	--	2,829	--	4,767	2,610	572	180	--
Oconto	35	--	1,718	96	--	855	--	1,545	1,788	1,020	161	22
Oneida	1,412	16	19,690	1,631	--	1,424	--	8,290	7,605	2,802	104	229
Shawano	2	286	508	524	--	2,429	166	2,311	1,451	789	153	459
Vilas	453	--	13,164	1,755	--	837	--	7,108	2,901	1,697	144	64
Total	6,531	1,063	70,532	12,710	--	22,994	166	79,099	39,765	13,944	1,830	4,625
Northwestern												
Ashland	442	--	8,482	1,227	--	2,264	--	8,788	4,432	712	1	206
Barron	22	--	697	--	--	11	--	9	16	55	32	2
Bayfield	114	--	19,825	385	--	387	--	1,311	953	2,258	2	23
Burnett	--	--	402	--	--	14	--	64	25	312	52	2
Douglas	--	--	9,308	108	--	125	--	561	522	--	--	--
Iron	531	--	7,670	912	--	4,904	--	9,025	3,140	310	--	613
Polk	--	--	--	--	--	6,683	--	925	1,884	43	--	--
Price	1,287	--	15,221	1,574	--	6,531	--	15,687	14,058	1,716	31	1,054
Rusk	1,081	--	7,072	393	--	2,547	156	4,846	3,652	4,552	591	315
Sawyer	1,244	--	17,906	1,966	--	1,779	--	6,809	4,947	1,446	168	82
Taylor	754	10	5,017	700	--	2,744	16	6,829	10,201	1,114	312	114
Washburn	--	--	3,581	27	--	116	--	753	813	9	3	27
Total	5,475	10	95,181	7,292	--	28,105	172	55,607	44,643	12,527	1,192	2,438
Central												
Adams	--	--	53	--	--	11	--	68	64	1,790	764	1
Chippewa	235	--	2,850	284	--	667	--	1,112	786	261	85	8
Clark	73	--	3,913	247	--	1,553	5	1,680	2,937	3,699	1,412	23
Eau Claire	6	--	347	--	--	46	--	67	278	915	359	22
Jackson	--	--	644	21	--	45	--	104	1,311	1,958	849	90
Juneau	--	--	234	--	--	182	--	345	447	2,984	1,318	10
Marathon	163	21	914	412	--	1,284	21	1,369	1,419	641	187	20
Marquette	--	--	208	--	--	74	--	214	110	1,257	624	--
Monroe	--	--	113	--	--	143	--	234	304	1,220	361	2
Portage	6	--	444	--	--	161	--	443	695	1,953	843	66
Waupaca	16	34	309	70	--	422	10	568	1,111	945	413	44
Waushara	--	--	--	--	--	--	--	--	--	42	28	--
Wood	7	--	783	208	--	94	--	627	1,547	2,207	1,222	19
Total	506	55	10,812	1,242	--	4,682	36	6,831	11,009	19,872	8,465	305
Southwestern												
Buffalo	--	--	--	--	--	--	--	--	--	--	--	--
Dunn	--	--	52	--	--	--	--	5	5	104	--	--
Grant	--	--	--	--	--	--	--	--	--	--	--	--
Iowa	--	--	2	--	--	1	--	2	3	--	--	1
La Crosse	--	--	--	--	--	--	--	--	--	84	31	--
Pepin	--	--	--	--	--	--	--	--	--	54	42	--
Pierce	--	--	--	--	--	--	--	--	--	--	--	--
Richland	--	--	--	--	--	--	--	--	--	--	--	--
St. Croix	--	--	--	--	--	--	--	--	--	--	--	--
Sauk	--	--	3	--	--	5	--	8	8	5	1	--
Trempealeau	--	--	--	--	--	--	--	--	--	23	--	--
Total	--	--	57	--	--	6	--	15	16	270	74	1
Southeastern												
Brown	--	--	--	--	--	--	--	--	--	--	--	--
Calumet	--	--	--	--	--	--	--	--	--	--	--	--
Columbia	--	--	109	--	--	5	--	9	9	525	417	--
Door	--	--	--	--	--	--	--	--	--	--	--	--
Green Lake	--	--	--	--	--	--	--	--	--	--	--	--
Kewaunee	--	--	--	--	--	--	--	--	--	--	--	--
Manitowoc	--	--	--	--	--	--	--	--	--	--	--	--
Outagamie	--	--	--	--	--	10	--	10	9	--	--	--
Walworth	--	--	--	--	--	--	--	--	--	--	--	--
Waukesha	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	109	--	--	15	--	19	18	525	417	--
State total	12,512	1,128	176,691	21,244	--	55,802	374	141,571	95,451	47,138	11,978	7,369

[1/] Includes only those counties that supplied pulpwood in 1983.

Table 10.--Central States pulpwood production by State and destination, 1979-1983.

(In thousand standard cords, unpeeled)

Year	Illinois			Indiana			Iowa			Missouri		
	Total	Destination		Total	Destination		Total	Destination		Total	Destination	
		Central States	Other States		Central States	Other States		Central States	Other States		Central States	Other States
1979	102	52	50	204	89	115	69	56	13	101	42	59
1980	102	45	57	178	69	109	44	39	5	105	38	67
1981	100	43	57	185	68	117	32	26	6	111	44	67
1982	76	19	57	185	51	134	14	10	4	81	23	58
1983	91	31	60	226	62	164	16	11	5	114	39	75

Table 11.--Trends in receipts of roundwood and residue as pulpwood, Central States, 1979-1983

(In thousand standard cords, unpeeled)

Type of material and area	1979	1980	1981	1982	1983
Roundwood					
Illinois	33	19	19	--	--
Indiana, Iowa, Missouri	96	75	60	40	69
Total	129	94	79	40	69
Residue					
Illinois	59	28	3	--	--
Indiana, Iowa, Missouri	107	99	112	63	79
Total	166	127	115	63	79
All material	295	221	194	104	148

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Blyth, James E.; Smith, W. Brad
Pulpwood production in the North Central Region by County, 1983. Resour. Bull. NC-85. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1985. 25 p.

Discusses 1983 production and receipts and production for recent years in the Lake and Central States. Shows Michigan, Minnesota, and Wisconsin production by species for each county and compares production by Forest Survey Unit with that of previous years. Presents 1983 production and receipt data for Illinois, Indiana, Iowa, and Missouri, and shows four production classes by county.

KEY WORDS: Roundwood, residue, receipts, Lake States, Central States.

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Forest Service

North Central Forest Experiment Station

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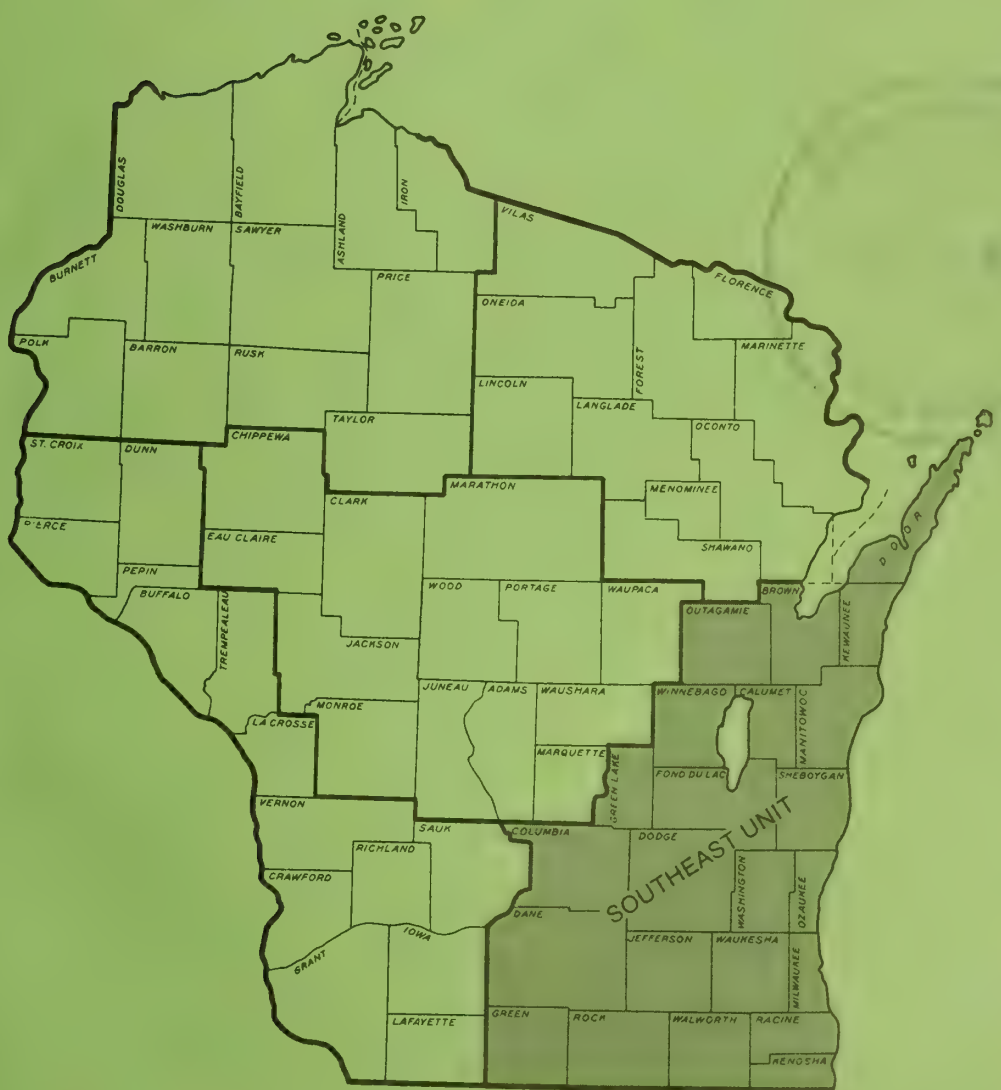
Timber Resource of Wisconsin's Southeast Survey Unit, 1983

John S. Spencer, Jr.



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1985

Information contained in this report includes the most commonly used Forest Inventory and Analysis statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information that can be provided from the raw inventory data are expected to pay for the retrieval costs. These costs will vary depending on the complexity of the request, from less than $100 for a relatively simple request to $2,000 for a complex retrieval involving the services of a Forest Inventory and Analysis computer programmer. If requests for data conflict with ongoing Forest Inventory and Analysis work, they will be scheduled so as to minimize the impact on the work unit.

Requests for unpublished information may be directed to:

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North Central Forest Experiment Station
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Area served: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, Wisconsin.

FOREWORD

Forest Inventory and Analysis (FIA) is a continuing endeavor as mandated by the Renewable Forest and Rangeland Resources Planning Act of 1974. Prior inventories were mandated by the McSweeney-McNary Forest Research Act of 1928. The objective of FIA is to periodically inventory the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. Up-to-date resource information is essential to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for forest resource evaluation in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, eastern South Dakota, and Wisconsin.

Fieldwork for the Wisconsin Statewide forest inventory was begun in the summer of 1981 and completed in late 1983. Reports on the three previous inventories of Wisconsin's timber resource are dated 1936, 1956, and 1968.

More accurate survey information was obtained during the 1983 survey than otherwise would have been feasible because of intensified field sampling. Such sampling was made possible by additional funding and field personnel provided the North Central Station by the Wisconsin State Legislature through the Department of Natural Resources. Data from the Departments' canvass of all primary wood-using plants in the State was used to help estimate the quantity of timber products harvested in Wisconsin.

Aerial photos used in the Southeast Unit Forest Inventory were furnished by the Wisconsin Department of Natural Resources and the USDA Agricultural Stabilization and Conservation Service.

TIMBER RESOURCE OF WISCONSIN'S SOUTHEAST SURVEY UNIT, 1983

John S. Spencer, Jr., *Principal Resource Analyst*

HIGHLIGHTS

Forest Area

- Forest land amounted to 937 thousand acres in 1983 (12 percent of the land area), compared with 930 thousand acres in 1968.
- Commercial forest land increased from 904 thousand acres in 1968 to 909 thousand acres in 1983.
- Nonindustrial private owners account for 89 percent of the commercial forest area.
- Productive-reserved forest land increased from 11 to 25 thousand acres between 1968 and 1983--primarily because of the addition of State-owned natural and scientific areas and county parks.
- The oak-hickory forest type is the most extensive with 293 thousand acres, followed by the maple-birch and elm-ash-soft maple types with 234 and 200 thousand acres, respectively.
- The red pine and white pine types nearly tripled in area between 1968 and 1983, but the aspen and paper birch types declined by more than one-third.
- Door County contained the largest area of commercial forest, 106 thousand acres--up 10 percent from the 96 thousand acres in 1968.
- Sawtimber stands predominate with 54 percent of the commercial area, up 30 percent from the 1968 area.
- The area of seedling-sapling stands declined 34 percent between inventories, but poletimber stands remained at about the same level, as the outgrowth of trees into sawtimber size almost equaled the ingrowth from sapling-seedlings.
- Average site index for commercial forest land is 63 feet at age 50.
- Average basal area per acre of growing-stock trees is 83 square feet.
- Plantations, primarily red pine and white pine, occupy 32 thousand acres.

Timber Volume

- Volume of growing stock increased from 664[1] to 908 million cubic feet between 1968 and 1983, a 37-percent gain.
- Hardwoods (772 million cubic feet) account for 85 percent of the growing-stock volume; softwoods (136 million cubic feet) account for 15 percent.
- Softwood growing-stock volume increased 75 percent between surveys, and hardwood volume gained 32 percent.
- The white oaks led all other species groups in 1983 in growing-stock volume with 110 million cubic feet, followed by select red oaks (77 million), northern white-cedar (75 million), white and green ash (72 million), and hard maple (69 million).
- Average growing-stock volume per acre in 1983 was 999 cubic feet, compared with 734 cubic feet in 1968.
- The volume of rough and rotten trees (148 million cubic feet), short-log trees (56 million), and salvable dead trees (14 million), together with the volume of growing-stock trees (908 million), total 1,126 million cubic feet.
- Sawtimber volume amounted to 2,774 million board feet[2] in 1983.
- Door County had the largest growing-stock volume (120 million cubic feet), but Dane County had the largest sawtimber volume (323 million board feet).
- Two-thirds of the sawtimber volume is in trees with grade 3 butt logs.
- Nonindustrial private parties own 89 percent of the growing-stock and sawtimber volumes.

Stand Conditions

- Net annual growth of growing stock on commercial forest land amounted to 23.4 million cubic feet in 1982, a 28 percent increase from the 18.3 million cubic feet in 1967.[3]

---

[1] *1968 growing-stock volumes have been adjusted from those published after the 1968 survey to conform to 1983 volumes because of changes in volume equations.*

[2] *International ¼-inch rule.*

[3] *1967 growth figures have been adjusted from those published after the 1968 survey to conform to 1982 volumes because of changes in Survey procedures and volume equations.*

- Average growth rate in 1982 was 2.6 percent of growing-stock inventory, compared with 2.8 percent in 1967.
- Growing-stock growth per acre averaged 25.7 cubic feet in 1982, compared with 20.3 cubic feet in 1967.
- Annual mortality of growing stock amounted to 9.3 million cubic feet in 1982 (1.0 percent of inventory).
- The mortality rate for softwoods, with generally younger trees, is 0.5 percent of inventory, but the hardwood rate is 1.1 percent.
- Disease accounted for the largest share of the known causes of mortality.
- Diseases of elm, chiefly Dutch elm disease, were responsible for 89 percent of the disease-caused mortality.

Timber Use

- Timber removals from growing stock totaled 8.1 million cubic feet in 1982, compared with 9.1 million cubic feet in 1967.
- Softwood removals were 43 percent greater in 1982 than in 1967, but hardwood removals were 15 percent lower.
- The oaks accounted for 38 percent of total removals in 1982.
- Eighty-one percent of total growing-stock removals was harvested for roundwood products--chiefly saw logs and fuelwood. Another 13 percent was "other" removals and the remaining 6 percent was logging residue.
- The volume of wood residue from primary wood-using plants in 1981 was 2.4 million cubic feet, 99 percent of which was used.

Biomass

- Greatest yields of live tree biomass are in the oak-hickory forest type (80 green tons per acre), the maple-birch type (79 tons) and the red pine type (70 tons).
- Live tree biomass (trees larger than 1-inch d.b.h.) totaled 62 million green tons in 1983, an average of 68 tons per acre. Almost half of this is in the boles of growing-stock trees.

APPENDIX

Accuracy of Survey

Forest Inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State and Unit levels. Consequently, the reported figures are estimates only. A measure of reliability of these figures is given by sampling errors. These sampling errors mean that the chances are two out of three that if a 100-percent inventory had been taken, using the same methods, the results would have been within the limits indicated.

For example, the estimated growing-stock volume in the Southeast Unit in 1983, 908.2 million cubic feet, has a sampling error of ± 5.88 percent (± 53.4 million cubic feet). The growing-stock volume from a 100-percent inventory would be expected to fall between 961.6 and 854.8 million cubic feet (908.2 ± 53.4), there being a one in three chance that this is not the case.

The following tabulation shows the sampling errors for the 1983 Southeast Unit Forest Inventory:

Item	Unit totals	Sampling error
Growing stock	(Million cubic feet)	(Percent)
Volume	908.2	5.88
Growth	23.4	9.10
Removals	8.1	38.74
Sawtimber	(Million board feet)	
Volume	2,774.4	6.69
Growth	77.3	9.77
Removals	27.9	43.09
Commercial forest land	(Thousand acres) 909.2	0.42

As survey data are broken down for areas smaller than a Survey Unit, the sampling error increases. For example, the sampling error for growing-stock volume in a particular county is higher than that for total growing-stock volume in the Unit (table 66 shows the sampling errors for estimates smaller than Unit totals).

Survey Procedures

We used a two-phase sampling design for the 1983 Wisconsin survey. This sampling scheme and associated estimators are similar to sampling with partial replacement (SPR) in that randomly located plots were available for remeasurement and new randomly located plots were established and measured. Major improvements in the new Wisconsin design were stratification for disturbance on the old sample and use of a growth model to improve regression estimates made on the old undisturbed forest plots. The growth model used was the Stand and Tree Evaluation and Modeling System (STEMS).[4]

The major steps in the new survey design were as follows:

1. The first phase of the survey was to interpret aerial photos. In this phase two sets of random points were located on current aerial photographs: a set of

[4]*For more information on STEMS, see: Belcher, D. L.; Holdaway, M. R.; Brand, G. J. A description of STEMS: The stand and tree evaluation and modeling system. Gen. Tech. Rep. NC-79. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1981. 18 p.*

new photo points and a set of relocated old photo points (ground plot locations from the previous inventory). In all, 45,454 1-acre points, including old ground sample locations, were systematically distributed across aerial photos of the entire Unit. These points were classified into land classes as shown below to make a preliminary estimate of forest area. Next, a total of 5,703 of these points were stereoclassified as to stand-size class and density. Finally, 3,118 points were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken.

Land class	Photo points classified	Photo points stereo-classified	Inventory plots checked
Forest land	5,432	5,432	374
Unproductive/reserved forest land	208	208	27
Nonforest land			
with trees	63	63	1
without trees	38,052	0	2,639
Water	1,699	0	77
Total	45,454	5,703	3,118

2. The second phase of the survey was to sample ground plots. The plot selection and measurement procedures are outlined in figure 1.

From the new photo points, a random sample of ground plots was established and land use, volume, mortality, and cutting were recorded. At each forest ground plot location, variable-radius plots (basal area factor 37.5) were established at 10 points uniformly

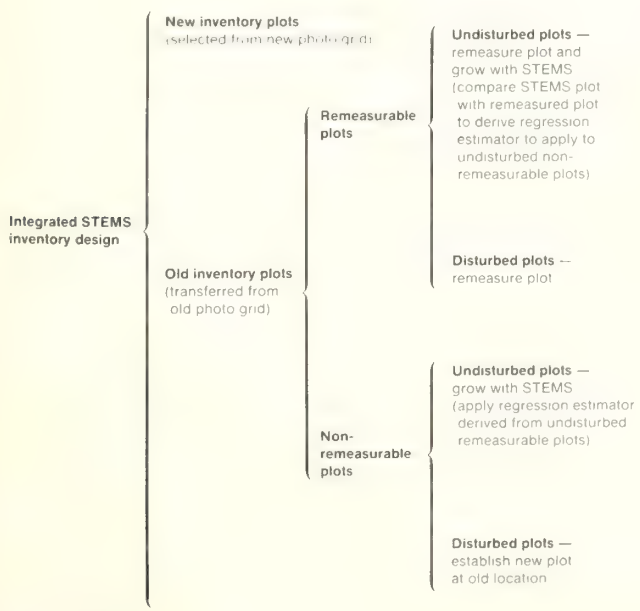
Integrated STEMS inventory design
New inventory plots
(selected from new photo grid)
Old inventory plots
(transferred from old photo grid)
Remeasurable plots
Non-remeasurable plots
Undisturbed plots — remeasure plot and grow with STEMS (compare STEMS plot with remeasured plot to derive regression estimator to apply to undisturbed non-remeasurable plots)
Disturbed plots — remeasure plot
Undisturbed plots — grow with STEMS (apply regression estimator derived from undisturbed remeasurable plots)
Disturbed plots — establish new plot at old location

Figure 1.—*Logic structure for the 1983 Wisconsin sample design.*

placed over the sample acre. These locations were permanently marked for future remeasurement.

We used a somewhat different procedure on the old inventory photo points (old plot locations). Old plots were either remeasurable (permanently marked) or nonremeasurable (not marked and thus difficult to relocate). Within both of these groups, old plots were additionally identified as undisturbed or disturbed. The remeasurable old inventory photo points that are classified as forest undisturbed were remeasured on the ground to obtain current land use, volume, growth, and removals data. Additionally, all forest undisturbed remeasurable plots were projected to the current time using STEMS to estimate current volume and growth. Comparing the projected and observed values on these plots provided regression estimators to adjust the projected values of the undisturbed nonremeasurable plots. All disturbed remeasurable plots were remeasured on the ground to assess changes since the last inventory.

Disturbance as used here refers to any change on a plot that can be detected on aerial photos and that the STEMS growth processor cannot predict, such as catastrophic mortality, cutting, regeneration, and land use change.

The nonremeasurable forest points are those that were not permanently marked during the 1968 inventory but played a crucial role in the new survey design. The nonremeasurable undisturbed forest points were visited on the ground at the time of the last survey and, following careful examination of both past and current photographs, it was determined that nothing happened that STEMS was unable to simulate. STEMS was then used to update the old plot and tree data. Thus, these points became ground plots even though the information was obtained without actually visiting the plot. The plot record for each updated plot was sent to the field for verification of current ownership information. For points classified as disturbed, a new ground plot was established as close to the old location as possible. This allowed information about land-use trends to be recorded even though the old plot could not be exactly relocated for remeasurement.

The estimation procedure for computing statistics from this sampling design was more complicated than the simple two-phase estimation procedure used in the past. In fact, this procedure yielded two independent samples, one coming from the new photo points and the other from the old photo points that were remeasured or projected. A more detailed description of the sampling design is available in a separate publication.[5]

3. Statistics on timber utilization during 1981 were obtained from mill surveys. The Wisconsin Depart-

ment of Natural Resources canvassed resident sawmills, veneer mills, and other primary wood-using plants. The North Central Forest Experiment Station canvassed out-of-State sawmills, pulpmills, and veneer mills to determine their use of Wisconsin timber. Fuelwood and fencepost output was based on a random sample of households and loggers to determine their production of fuelwood and fenceposts. Estimates of primary mill residue used for fuelwood were obtained from the canvass of Wisconsin primary wood-using plants.

4. More than 2,500 felled trees on 133 active logging operations were measured throughout the State during 1981-1982 to develop wood-utilization factors for converting timber products output to timber removals for saw logs and pulpwood. Factors for all other products were obtained during the 1966-1967 Wisconsin utilization study.

5. Field data were sent to St. Paul, Minnesota, to be processed and analyzed.

COMPARING WISCONSIN'S FOURTH INVENTORY WITH THE THIRD INVENTORY

Data from new forest inventories are often compared with data from earlier inventories to determine trends in forest resources. However, changes in procedures and definitions between surveys often make it necessary to adjust earlier survey data so that they are comparable to data from the new survey. A consistency check was made for each Survey Unit in Wisconsin to ensure that the changes observed between inventories reflect actual changes in the resource and not changes in definitions or procedures.

Identifying and Correcting Procedural Changes

Between the 1968 and 1983 inventories of Southeast Wisconsin some procedural changes were made in the method of deriving annual mortality estimates and determining forest type, and revised volume equations were used.

Mortality figures for the 1968 inventory were based on field estimates from nonremeasurement plots. Information gathered on remeasurement plots during the current inventory was used to adjust the 1968 mortality figures. This adjustment, together with the new volume equations, also changed the estimate of net growth for the 1968 inventory. Additionally, the old spruce-fir forest type was separated into two distinct types for the new inventory--white spruce and balsam fir. Comparisons with old data may be made by adding the two new types together.

The difference in volume equations resulted in a 2.8 percent decrease in reported growing-stock volume for 1968.

Checking for Consistency

A test was made to ensure that it was possible to move from the adjusted 1968 resource statistics to the 1983 values by means of Timber Resource Analysis System (TRAS), a USDA Forest Service computer program for updating, backdating, and projecting timber volume, growth, mortality, and removals. Using the adjusted 1968 numbers of softwood and hardwood trees by 2-inch diameter class and applying 1983 cubic feet per tree estimates, volumes were generated for the 1968 inventory that are comparable to 1983 volumes. Then, using growth rates, mortality rates, and removal rates for the period between the two surveys, TRAS projected the inventory from 1968 to 1983. The program prints out volumes by diameter class for softwoods and hardwoods for selected years in the period. Thus, inconsistencies in volume, growth, mortality, and removals were identified and resolved.

TRAS generates an estimate of what total removals had to be for the inventory to have changed as it did between surveys, given the volume, growth, and mortality data. Estimates of removals for products and for logging residues, two of the three components of total timber removals, were available from an independent utilization study. An estimate of "other" removals (see Definition of Terms in Appendix), the third component of total removals, was made by subtracting the first two removals components from the TRAS-generated total removals estimate. This estimate of "other" removals was compared with findings from remeasurement plots and new plots (stump counts and land use change) to check its validity. When necessary, TRAS was rerun and adjusted until other removals were compatible with the estimate from field data.

LOG GRADE

In Wisconsin's Southeast Unit the butt log of every sawtimber tree on every full permanent sample plot was graded for quality.

Butt logs were graded on the basis of external characteristics as indicators of quality. Hardwood species were graded according to "Hardwood Log Grades for Standard Lumber."[6] The best 12-foot section of the

[5] *Hahn, J. T.; Hansen, M. H. A sampling procedure incorporating a growth simulator. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station. (Manuscript in process).*

lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log-grade standards, was graded as follows:

Forest Service standard grades for hardwood factory saw logs

Grading factors		Specifications							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Scaling diameter, inches		13-15[1]	16-19	20 +	11 +[2]	12 +			8 +
Length without trim, feet			10 +		10 +	8-9	10-11	12 +	8 +
Required clear cuttings[3] of each of three best faces[4]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No Limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance	For logs with less than one-fourth of end in sound defects	15 percent			30 percent				50 percent
	For logs with more than one-fourth of end in sound defects	10 percent			20 percent				35 percent
Maximum scaling deduction		40 percent[5]			50 percent[6]				50 percent

[1]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[2]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[3]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[4]A face is one-fourth of the surface of the log as divided lengthwise.
[5]Otherwise #1 logs with 41-60 percent deductions can be #2.
[6]Otherwise #2 logs with 51-60 percent deductions can be #3.

[6]*Vaughn, C. L.; Wollin, C. A.; McDonald, K. A.; Bulgrin, E. H. Hardwood log grades for standard lumber. Res. Pap. FPL-63. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1966. 52 p.*

Forest Service standard specifications for hardwood construction logs (tie and timber logs)[1]

Position in tree		Butt and upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		One-fourth of the diameter at the small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of one-third of log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed one-third of log diameters at point of occurrence.
	Holes	Any number provided none has a diameter over one-third of log diameter at point of occurrence, and none extends over 3 inches into included timber.[2]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[2] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit one shake not to exceed one-fourth of the scaling diameter and will admit a longitudinal split not extending over 5 inches into the contained timber.

[1]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only nonfactory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, then it may be necessary to subdivide the class into grades.

[2]Included timber is always square, and dimension is judged from small end.

Softwood species were graded according to the following specifications:

Log Grades for Eastern White Pine

Log grade	Minimum size Diameter	Length[1]	Sweep or crook allowance	Total cull allowance including sweep	Maximum weevil injury	Allowable knot size (inches)[2] on three best faces or minimum clearness on four faces
	(Inches)	*(Feet)*	*(Percent)*		*(Number)*	*(Inches)*
1	12 & 13	8-16	20	50	0	Four faces clear full length
	14+	10-16	20	50	0	Two faces clear full length, or four faces clear 50 percent length (6 feet min. length)[3]
2	6+	8-16	30	50	0	Sound knots 1.e[4] D/6 and less than 3 inches.[5] Unsound knots: 1.e. 1½ inches and for: butt, logs 1.e. D/12, upper logs 1.e.D/10, or four faces clear 50 percent of length
3	6+	8-16	40	50	8-foot logs: 1 weevil 10-foot+ logs: 2 weevils	Sound knots 1.e.D/3 and less than 5 inches. Unsound knots 1.e. D/6 and less than 2½ inches.
4	6+	8-16	50	50	No limit	No limit

[1]Plus trim.
[2]Disregard all knots less than ½-inch diameter in all grades.
[3]The sum of the diameter of sound knots plus twice the sum of the diameter of unsound knots (in inches) is less than or equal to half of the diameter of the log (inches).
[4]I.e. means less than or equal to.
[5]D means d.i.b. of log at location of knot.

LOG GRADES FOR JACK PINE AND RED PINE

Grade 1: logs with three or four clear faces.[7]

Grade 2: logs with one or two clear faces.

Grade 3: logs with no clear faces.

After the tentative log grade is established, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3. Net scale after deduction for defect must be at least 50 percent of the gross contents of the log.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one-third the diameter inside bark at small end.

2. *Heart rot.* Degrade any tentative 1 or 2 log one grade if conk, massed hyphae, or other evidence of advanced heart rot is found anywhere in it.

[7]*A face is one fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than ½-inch in diameter, overgrown knots of any size, holes more than ¼-inch in diameter. Faces may be rotated to obtain the maximum number of clear ones.*

LOG GRADES FOR ALL OTHER SOFTWOOD LOGS

Grade 1

1. Logs must be 16 inches in diameter or larger, 10 feet in length or longer, and have not more than 30 percent of gross scale deducted for defect.

2. Logs must be at least 75 percent clear on each of three faces.

3. All knots outside clear cutting must be sound and not more than 2½-inches in size.

Grade 2

1. Logs must be 12 inches in diameter or larger, 10 feet in length or longer, and have a net scale of at least 50 percent of the gross contents of the log after deduction for defect.

2. Logs must be at least 50 percent clear on each of three faces or 75 percent clear on two faces.

Grade 3

1. Logs must be 6 inches in diameter or larger, 8 feet in length or longer, and have a net scale of at least 50 percent of the gross contents of the log after deduction for defect.

Note: (A) Diameters are diameter inside bark (d.i.b.) at small end of log.
(B) Percent clear refers to percent clear in one continuous section.

TREE SPECIES GROUPS IN WISCONSIN[8]

SOFTWOODS
- Jack pine ..... *Pinus banksiana*
- Red pine ..... *Pinus resinosa*
- Eastern white pine ..... *Pinus strobus*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Northern white-cedar ..... *Thuja occidentalis*
- Other softwoods
  - Eastern redcedar ..... *Juniperus virginiana*
  - Norway spruce ..... *Picea abies*
  - Scotch pine ..... *Pinus sylvestris*

HARDWOODS
- White oaks
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus macrocarpa*
  - Chinkapin oak ..... *Quercus muehlenbergii*
- Select red oak
  - Northern red oak ..... *Quercus rubra*
- Other red oaks
  - Northern pin oak ..... *Quercus ellipsoidalis*
  - Black oak ..... *Quercus velutina*
- Select hickory
  - Shagbark hickory ..... *Carya ovata*
- Other hickory
  - Bitternut hickory ..... *Carya cordiformis*
- Yellow birch ..... *Betula alleghaniensis*
- Hard maple
  - Sugar maple ..... *Acer saccharum*
  - Black maple ..... *Acer nigrum*
- Soft maples
  - Red maple ..... *Acer rubrum*
  - Silver maple ..... *Acer saccharinum*
- Ashes
  - White ash ..... *Fraxinus americana*
  - Black ash ..... *Fraxinus nigra*
  - Green ash ..... *Fraxinus pennsylvanica*
- Balsam poplar ..... *Populus balsamifera*
- Eastern cottonwood ..... *Populus deltoides*
- Sycamore ..... *Platanus occidentalis*
- Aspens
  - Bigtooth aspen ..... *Populus grandidentata*
  - Quaking aspen ..... *Populus tremuloides*
- American basswood ..... *Tilia americana*
- Beech ..... *Fagus grandifolia*
- Black walnut ..... *Juglans nigra*
- Black cherry ..... *Prunus serotina*
- Butternut ..... *Juglans cinerea*
- Elms
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasii*
- Hackberry ..... *Celtis occidentalis*
- Paper birch ..... *Betula papyrifera*
- Black willow ..... *Salix nigra*
- Other hardwoods
  - Boxelder ..... *Acer negundo*
  - Black locust ..... *Robinia pseudoacacia*
  - Honeylocust ..... *Gleditsia triacanthos*
  - River birch ..... *Betula nigra*
  - Red mulberry ..... *Morus rubra*
  - Blackgum ..... *Nyssa sylvatica*
  - Northern catalpa..... Catalpa speciosa
- Noncommercial species
  - Mountain maple ..... *Acer spicatum*
  - Eastern hophornbeam ..... *Ostrya virginiana*
  - Peachleaf willow ..... *Salix amygdaloides*
  - American hornbeam ..... *Carpinus caroliniana*
  - Hawthorn ..... *Crataegus* spp.
  - Striped maple ..... *Acer pensylvanicum*
  - Mountain ash ..... *Sorbus* spp.
  - Pin cherry ..... *Prunus pensylvanica*
  - Chokecherry ..... *Prunus virginiana*

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 pound = 0.454 kilogram.
1 ton = 0.907 metric ton.

DEFINITION OF TERMS

Basal area.—The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result is usually expressed as square feet of basal area per acre.

[8]*The common and scientific names are based on: Little, Elbert L. Check list of native and naturalized trees of the United States. Agric. Handb. 541. Washington, DC: U.S. Department of Agriculture, Forest Service; 1979. 375 p.*

Biomass.—The above-ground volume of all live trees (including bark and foliage). Biomass is made up of 5 components:

Growing-stock bole.—Biomass of a growing-stock tree from a 1-foot stump to a variable 4-inch top.

Growing-stock tops and limbs.—Biomass of a growing-stock tree from a 1-foot stump minus the growing-stock bole.

Cull bole.—Biomass of a cull tree from a 1-foot stump to a variable 4-inch top.

Cull tops and limbs.—Biomass of a cull tree from a 1-foot stump minus the cull bole.

1- to 5-inch trees.—Biomass of all live trees from 1-to 5-inches in diameter at breast height.

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land are capable of producing more than 20 cubic feet per acre per year of annual growth when managed. Currently inaccessible and inoperable areas are included except when the areas involved are small and unlikely to become suitable for producing industrial wood in the foreseeable future.)

Commercial species.—Tree species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

County and municipal land.—Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Cull.—Portions of a tree that are unusable for industrial wood products because of rot, form, or other defect.

Diameter classes.—A classification of trees based on diameter outside bark, measured at breast height (4-½ feet above the ground). (Note: d.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.)

Farm.—Any land from which $1,000 or more of agricultural products were produced and sold during the year.

Farmer-owned land.—Land owned by farm operators. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparing specified standards with basal area and/or number of trees, age or size, and spacing.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions for land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, and water.

Forest industry land.—Land owned by companies or individuals operating primary wood-using plants.

Forest trees.—Woody plants having a well-developed stem and usually more than 12 feet tall at maturity.

Forest type.—A classification of forest land based on the species forming a plurality of live tree stocking. Major forest types in the State are:

Jack pine.—Forests in which jack pine comprises a plurality of the stocking. (Common associates include eastern white pine, red pine, aspen, birch, and oak.)

Red pine.—Forests in which red pine comprises a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and oak.)

White pine.—Forests in which eastern white pine comprises a plurality of the stocking. (Common associates include red pine, aspen, birch, and maple.)

Balsam fir.—Forests in which balsam fir and white spruce comprise a plurality of the stocking with balsam fir the most common. (Common associates include white spruce, aspen, maple, birch, northern white-cedar, and spruce.)

White spruce.—Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include balsam fir, aspen, maple, birch, and northern white-cedar.)

Black spruce.—Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack, northern white-cedar, and balsam fir.)

Northern white-cedar.—Forests in which swamp conifers comprise a plurality of the stocking with northern white-cedar the most common. (Common associates include balsam fir, black ash, spruce, and black spruce.)

Tamarack.—Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce, balsam fir, and aspen.)

Oak-hickory.—Forests in which northern red oak, white oak, bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, aspen, birch, and maple.)

Elm-ash-soft maple.—Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include aspen, birch, and balsam fir.)

Maple-birch.—Forests in which sugar maple, basswood, yellow birch, elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, hemlock, and basswood.)

Aspen.—Forests in which quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include oak, pine, balsam fir, and paper birch.)

Paper birch.—Forests in which paper birch comprises a plurality of the stocking. (Common associates include maple, aspen, and balsam fir.)

Exotic.—Forests in which species not native to the State comprise a plurality of the stocking. (Mostly Scotch pine plantations.)

Gross area.—The entire area of land and water as determined by the Bureau of the Census, 1970.

Growing-stock trees.—Live trees of commercial species, excluding rough and rotten trees.

Growing-stock volume.—Net volume in cubic feet of growing-stock trees 5 inches d.b.h. and over, from a 1-foot stump to a minimum 4 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Cubic feet can be converted to standard cords by dividing by 79. One standard cord is 128 cubic feet of stacked wood, including bark and air.

Hardwoods.—Dicotyledonous trees, usually broadleaved and deciduous.

Idle farmland.—Includes former cropland, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.—Land currently improved for grazing by cultivating, seeding, irrigating, or clearing of trees or brush and less than 16.7 percent stocked with live trees.

Indian land.—All lands held in trust by the United States for individual Indians or tribes, or all lands, titles to which are held by individual Indians or tribes, subject to Federal restrictions against alienation.

Land area.—A. *Bureau of the Census.* The area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

B. *Forest Inventory and Analysis.* The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Live trees.—Growing-stock, rough, and rotten trees 1 inch d.b.h. and larger.

Log grades.—A classification of logs based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.—The unused growing stock portions of trees cut or killed by logging.

Maintained road.—Any road, hard-topped or other surfaces, that is plowed or graded at least once a year. Includes rights-of-way that are cut or treated to limit herbaceous growth.

Marsh.—Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

Merchantable.—Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

Miscellaneous federal land.—Federal land other than National Forest, and land administered by the Bureau of Land Management.

Miscellaneous private land.—Privately owned land other than forest-industry and farmer-owned land.

Mortality.—The volume of sound wood in growing-stock and sawtimber trees that die annually.

National Forest land.—Federal land that has been legally designated as National Forest or purchase units, and other land administered by the USDA Forest Service.

Net annual growth of growing stock.— The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.—The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.—Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.—(a) Unproductive forest land and (b) productive-reserved forest land.

Noncommercial species.—Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land.—Land that has never supported forests, and land formerly forested where use for timber management is precluded by development

for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120 feet wide and more than 1 acre in area to qualify as nonforest land.)

a. *Nonforest land without trees.*—Nonforest land with no live trees present.

b. *Nonforest land with trees.*—Nonforest land with one or more trees per acre at least 5 inches d.b.h.

Nonstocked land.—Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other removals.—Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the commercial forest land classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership.—Property owned by one owner, regardless of the number of parcels in a specified area.

Ownership size class.—The amount of commercial forest land owned by one owner, regardless of the number of parcels.

Owner tenure.—The length of time a property has been held by the owner.

Physiographic class.—A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are:

Xeric sites.—Very dry soils where excessive drainage seriously limits both growth and species occurrence. Example: sandy jack pine plains.

Xeromesic sites.—Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

Mesic sites.—Deep, well-drained soils. Growth and species occurrence are limited only by climate.

Hydromesic sites.—Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

Hydric sites.—Very wet sites where excess water seriously limits both growth and species occurrence. Example: frequently flooded river bottoms and spruce bogs.

Plant byproducts.—Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.—Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stands.—(See stand-size class.)

Poletimber trees.—Growing-stock trees of commercial species at least 5 inches d.b.h. but smaller than sawtimber size.

Productive-reserved forest land.—Forest land sufficiently productive to qualify as commercial forest land but withdrawn from timber utilization through statute, administration regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

Productive-deferred.—Forest land sufficiently productive to qualify as commercial forest land but presently withdrawn from timber utilization because it is being considered for possible inclusion into the Wilderness or Scenic River system.

Rotten trees.—Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, because they do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of extra cull volume in a tree is rotten.

Rough trees.—(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, because they do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.—Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs, veneer logs and bolts; cooperage logs and bolts; pulpwood;fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round, split, or hewn products.)

Salvable dead trees.—Standing or down dead trees considered merchantable by regional standards.

Saplings.—Live trees 1 to 5 inches d.b.h.

Sapling-seedling stands.—(See stand-size class.)

Saw log.—A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by regional standards.

Saw log portion.—That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.—The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

Sawtimber stands.—(See stand-size class.)

Sawtimber trees.—Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and

meeting regional specifications for freedom from defect. Softwoods must be at least 9 inches d.b.h. Hardwoods must be at least 11 inches d.b.h.

Sawtimber volume.—Net volume of the saw log portion of live sawtimber in board feet, International ¼-inch rule, from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Seedlings.—Live trees less than 1 inch d.b.h. that are expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).—Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

Shrub biomass.—The total above-ground weight (including the bark) of selected shrubs and trees less than 1 inch d.b.h.

Site class.—A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Site index.—An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.—Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.—A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-age class.—Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.—The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.—A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

a. *Sawtimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

b. *Poletimber stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

c. *Sapling-seedling stands.*—Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

d. *Nonstocked stands.*—Stands in which stocking of growing-stock trees is less than 16.7 percent.

State land.—Land either owned by States or leased to them, for 50 years or more.

Stocking.—The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

Overstocked stands.—Stands in which stocking of trees is 134.0 percent or more.

Fully stocked stands.—Stands in which stocking of trees is from 101.0 to 133.9 percent.

Medium stocked stands.—Stands in which stocking of trees is from 61.0 to 100.9 percent.

Poorly stocked stands.—Stands in which stocking of trees is from 16.7 to 60.9 percent.

Nonstocked areas.—Commercial forest land on which stocking of trees is less than 16.7 percent.

Timber removals from growing stock.—The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals.

Timber removals from sawtimber.—The net board-foot volume of live sawtimbertrees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timber products output.—All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edging, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree biomass.—The total aboveground weight (including the bark) of all trees from 1 to 5 inches in d.b.h., and the total aboveground weight (including the bark) from a 1-foot stump for trees more than 5 inches in diameter.

Tree size class.—A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

Unproductive forest land.—Forest land incapable of producing 20 cubic feet per acre of annual growth or of yielding crops of industrial wood under natural conditions because of adverse site conditions. (Note: Adverse conditions include shallow soil, dry climate, poor drainage, high elevation, steepness, and rockiness).

Upper stem portion.—That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4 inches outside bark or to the point where the central stem breaks into limbs.

Urban and other areas.—Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards, cemeteries, roads; railroads; airports; beaches; powerlines; and other rights-of-way; or other nonforest land not included in any other specified land use class.

Water.—(a) *Bureau of the Census.*—Permanent inland water surfaces, such as lakes, reservoirs, and ponds at least 40 acres in area; and streams, sloughs, estuaries, and canals at least one-eighth of a statute mile wide.

(b) Noncensus.—Permanent inland water surfaces, such as lakes, reservoirs, and ponds from 1 to 39.9 acres in area; and streams, sloughs, estuaries, and canals from 120 feet to one-eighth of a statute mile wide.

Wooded pasture.—Improved pasture with more than 16.7 percent stocking in live trees but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or there is other evidence of grazing.

Wooded strip.—An acre or more of natural continuous forest land that would otherwise meet survey standards for commercial forest land except that it is less than 120 feet wide.

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BIOMASS

Table 64.--All live tree biomass on commercial forest land by species group and forest type
Table 65.--All live tree biomass by species group and tree biomass component

SAMPLING ERRORS

Table 66.--Sampling errors for estimates smaller than the Unit totals of volume, net growth, removals, and area of commercial forest land
Table 67.--Sampling errors for county totals of growing-stock volume, net growth, removals, and area of commercial forest land

Table 1.--Area of land by land class, Southeast Unit, Wisconsin, 1968 and 1983

(In thousand acres)

Land class	1968	1983
Forest land		
Commercial forest land		
Jack pine	--	2.7
Red pine	4.2	12.2
White pine	5.7	16.4
Balsam fir	--	--
White spruce	5.4	5.0
Black spruce	--	2.7
Nortnern white-cedar	50.5	53.6
Tamarack	8.5	9.2
Oak-hickory	279.7	292.8
Elm-ash-soft maple	165.3	200.5
Maple-birch	236.5	233.9
Aspen	100.8	63.3
Paper birch	13.8	8.3
Nonstocked	33.1	8.6
Subtotal	903.5	909.2
Noncommercial forest land		
Unproductive	15.6	2.9
Productive-reserved	10.7	25.4
Subtotal	26.3	28.3
Total	929.8	937.5
Nonforest land		
Cropland	4,823.7	5,347.9
Pasture and range	348.7	322.8
Other	1,756.6	1,278.3
Total	6,929.0	6,949.0
Total land	7,858.8	7,886.5
Water (Bureau of the Census)	301.8[1/]	311.3[2/]
Total land and water	8,160.6[1/]	8,197.8[2/]

[1/] U.S. Department of Commerce, Bureau of Census, 1960.
[2/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 2.--Area of land by land use class and county, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Land use class	All counties	County											
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Forest land													
Commercial forest	909.2	47.4	24.7	84.2	90.2	27.6	106.3	33.9	30.9	21.0	29.0	10.8	36.8
Unproductive forest	2.9	--	--	--	--	--	--	--	--	--	--	--	--
Productive reserved	25.4	1.7	0.4	0.2	0.9	0.2	13.7	1.2	--	--	0.3	0.9	--
Total	937.5	49.1	25.1	84.4	91.1	27.8	120.0	35.1	30.9	21.0	29.3	11.7	36.8
Nonforest land													
Nonforest with trees													
Cropland with trees	20.3	--	--	--	7.5	--	2.7	--	--	--	5.1	--	--
Improved pasture with trees	12.2	--	--	--	--	--	--	2.5	5.0	--	--	2.3	--
Wooded strips	--	--	--	--	--	--	--	--	--	--	--	--	--
Idle farmland with trees	--	--	--	--	--	--	--	--	--	--	--	--	--
Marsh with trees	19.8	--	--	5.0	--	--	--	2.1	--	4.6	2.7	--	--
Urban and other windbreaks	53.2	--	--	2.5	2.5	--	2.7	--	--	--	--	--	--
Windbreaks	10.4	--	--	--	--	--	--	--	2.5	--	--	--	--
Wooded pasture	2.4	--	--	--	--	--	--	--	--	--	--	--	--
Subtotal	118.3	--	--	7.5	10.0	--	5.4	4.6	7.5	4.6	7.8	2.3	--
Nonforest without trees													
Cropland without trees	5,327.6	214.2	156.8	355.0	592.1	438.6	156.6	342.9	302.1	111.0	252.8	101.1	168.0
Improved pasture without trees	308.2	17.1	10.8	17.2	10.0	25.2	8.1	35.4	7.7	26.1	20.4	7.0	4.8
Idle farm without trees	44.0	--	--	2.4	--	--	--	--	--	--	--	9.4	--
Marsh without trees	301.9	2.4	--	17.1	10.0	45.9	2.7	22.8	2.5	49.6	28.6	9.3	--
Other farm-farmstead	149.8	7.3	5.4	--	15.0	10.2	10.9	7.7	10.1	5.2	5.1	--	2.5
Urban and other	693.1	45.4	10.8	9.9	42.4	20.2	10.8	15.3	12.5	10.7	15.6	33.0	7.4
Noncensus water	6.1	--	--	--	0.3	--	--	--	--	--	--	0.7	--
Subtotal	6,830.7	286.4	183.8	401.6	669.8	540.1	189.1	424.1	334.9	202.6	322.5	160.5	182.7
Total	6,949.0	286.4	183.8	409.1	679.8	540.1	194.5	428.7	342.4	207.2	330.3	162.8	182.7
Total land	7,886.5	335.5	208.9	493.5	770.9	567.9	314.5	463.8	373.3	228.2	359.6	174.5	219.5
Water (Bureau of the Census)[1/]	311.3	13.5	45.2	14.6	22.2	13.4	13.2	25.7	0.8	15.4	13.4	3.6	0.8
Total land and water[1/]	8,197.8	349.0	254.1	508.1	793.1	581.3	327.7	489.5	374.1	243.6	373.0	178.1	220.3

(Table 2 continued on next page)

[1/] U.S. Department of Commerce, Bureau of Census, 1980.

(Table 2 continued)

Land use class	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Forest land											
Commercial forest	56.5	--	70.7	16.3	16.9	26.9	51.5	35.6	45.7	32.1	14.2
Unproductive forest	--	--	--	--	--	--	--	--	--	2.9	--
Productive reserved	0.9	--	--	--	0.8	1.2	1.1	0.2	0.1	1.6	--
Total	57.4	--	70.7	16.3	17.7	28.1	52.6	35.8	45.8	36.6	14.2
Nonforest land											
Nonforest with trees											
Cropland with trees	--	--	--	--	--	2.4	--	--	--	2.6	--
Improved pasture with trees	--	--	--	--	2.4	--	--	--	--	--	--
Wooded strips	--	--	--	--	--	--	--	--	--	--	--
Idle farmland with trees	--	--	--	--	--	--	--	--	--	--	--
Marsh with trees	2.7	--	2.7	--	--	--	--	--	--	--	--
Urban and other windbreaks	--	21.3	7.1	--	--	5.1	2.2	--	3.3	5.8	0.7
Windbreaks	--	--	2.8	2.6	--	2.5	--	--	--	--	--
Wooded pasture	--	--	--	--	--	2.4	--	--	--	--	--
Subtotal	2.7	21.3	12.6	2.6	2.4	12.4	2.2	--	3.3	8.4	0.7
Nonforest without trees											
Cropland without trees	281.1	--	258.9	97.8	144.8	314.2	224.7	264.1	163.8	197.5	199.5
Improved pasture without trees	2.8	--	19.5	5.6	7.2	23.0	7.6	12.3	24.8	13.1	2.5
Idle farm without trees	--	--	--	--	5.0	7.5	2.5	14.7	2.5	--	--
Marsh without trees	--	--	8.1	2.8	7.2	7.4	12.3	14.5	4.9	21.1	32.7
Other farm-farmstead	8.4	--	13.7	2.8	7.2	7.6	10.1	--	10.0	10.6	--
Urban and other	27.7	133.1	27.5	22.4	21.7	61.0	17.8	24.2	19.7	66.0	38.0
Noncensus water	--	0.2	--	--	0.9	1.8	--	--	0.7	1.5	--
Subtotal	320.0	133.3	327.7	131.4	194.0	422.5	275.0	319.8	226.4	309.8	272.7
Total	322.7	154.6	340.3	134.0	196.4	434.9	277.2	319.8	229.7	318.2	273.4
Total land	380.1	154.6	411.0	150.3	214.1	463.0	329.8	355.6	275.5	354.8	287.6
Water (Bureau of the Census)[1/]	1.3	2.2	1.7	0.3	4.1	1.3	1.8	13.7	3.3	16.8	83.0
Total land and water[1/]	381.4	156.8	412.7	150.6	218.2	464.3	331.6	369.3	278.8	371.6	370.6

[1/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 3.--Area of commercial forest land by ownership class and county, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All counties	County											
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
National Forest	--	--	--	--	--	--	--	--	--	--	--	--	--
Miscellaneous federal	4.6	2.5	--	--	--	--	--	2.1	--	--	--	--	--
State	67.5	--	4.8	7.4	5.4	--	2.7	8.5	--	--	--	1.8	--
County and municipal	12.9	5.0	--	--	--	--	--	--	2.4	--	--	--	--
Indian	--	--	--	--	--	--	--	--	--	--	--	--	--
Forest industry	15.5	--	--	2.5	--	--	5.4	--	--	--	--	--	--
Farmer	429.3	20.0	9.9	27.1	54.7	18.3	40.8	14.7	23.8	14.1	15.8	3.6	23.5
Misc. private-corporation	56.5	2.5	--	2.4	2.7	2.3	8.3	2.2	--	--	2.6	--	2.6
Misc. private-individual	322.9	17.4	10.0	44.8	27.4	7.0	49.1	6.4	4.7	6.9	10.6	5.4	10.7
All owners	909.2	47.4	24.7	84.2	90.2	27.6	106.3	33.9	30.9	21.0	29.0	10.8	36.8

Ownership class	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
National Forest	--	--	--	--	--	--	--	--	--	--	--
Miscellaneous federal	--	--	--	--	--	--	--	--	--	--	--
State	8.1	--	--	--	--	5.0	8.9	--	3.3	11.6	--
County and municipal	--	--	--	--	--	--	2.3	--	3.2	--	--
Indian	--	--	--	--	--	--	--	--	--	--	--
Forest industry	2.6	--	5.0	--	--	--	--	--	--	--	--
Farmer	24.2	--	25.0	6.5	6.8	14.6	20.3	10.1	29.4	17.6	8.5
Misc. private-corporation	2.7	--	10.0	3.2	--	2.5	2.3	10.2	--	--	--
Misc. private-individual	18.9	--	30.7	6.6	10.1	4.8	17.7	15.3	9.8	2.9	5.7
All owners	56.5	--	70.7	16.3	16.9	26.9	51.5	35.6	45.7	32.1	14.2

Table 4.--Area of commercial forest land by ownership class and site class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
National Forest	--	--	--	--	--	--	--
Miscellaneous federal	4.6	--	--	--	--	--	4.6
State	67.5	--	--	1.8	12.0	28.0	25.7
County and municipal	12.9	--	--	--	2.5	10.4	--
Indian	--	--	--	--	--	--	--
Forest industry	15.5	--	--	--	2.5	7.8	5.2
Farmer	429.3	--	--	15.2	86.6	160.2	167.3
Misc. private-corporation	56.5	--	--	--	7.5	22.9	26.1
Misc. private-individual	322.9	--	--	5.0	61.0	126.1	130.8
All owners	909.2	--	--	22.0	172.1	355.4	359.7

Table 5.--Area of commercial forest land by ownership class and stand-volume class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Stand-volume class (board feet[1/])		
		Less than 1,500	1,500 to 5,000	5,000+
National Forest	--	--	--	--
Miscellaneous federal	4.6	2.5	2.1	--
State	67.5	28.0	26.8	12.7
County and municipal	12.9	5.5	2.4	5.0
Indian	--	--	--	--
Forest industry	15.5	7.8	2.5	5.2
Farmer	429.3	175.7	170.0	83.6
Misc. private-corporation	56.5	21.1	25.8	9.6
Misc. private-individual	322.9	122.8	155.9	44.2
All owners	909.2	363.4	385.5	160.3

[1/] International 1/4-inch rule.

Table 6.--Area of privately owned commercial forest land by ownership class, owner tenure, and size of holding, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class and owner tenure class	All sizes	Size of holding (acres)								
		1-4	5-10	11-20	21-50	51-100	101-500	501-2,500	2,501-5,000	5,001+
Forest industry										
1-4 years	--	--	--	--	--	--	--	--	--	--
5-9 years	7.8	--	--	--	--	2.5	--	5.3	--	--
10-19 years	7.7	--	--	--	5.0	--	--	2.7	--	--
20+ years	--	--	--	--	--	--	--	--	--	--
All classes	15.5	--	--	--	5.0	2.5	--	8.0	--	--
Farmer										
1-4 years	65.2	2.5	5.2	18.9	14.8	13.9	9.9	--	--	--
5-9 years	97.2	5.3	--	27.3	41.2	20.1	3.3	--	--	--
10-19 years	145.0	10.2	2.6	45.9	47.6	33.9	4.8	--	--	--
20+ years	121.9	5.2	7.7	40.0	51.4	14.8	2.8	--	--	--
All classes	429.3	23.2	15.5	132.1	155.0	82.7	20.8	--	--	--
Misc. priv.-corporation										
1-4 years	18.4	3.2	2.4	--	7.7	5.1	--	--	--	--
5-9 years	12.9	--	--	--	--	5.1	7.8	--	--	--
10-19 years	19.9	2.5	2.5	--	--	10.1	4.8	--	--	--
20+ years	5.3	--	--	--	2.6	2.7	--	--	--	--
All classes	56.5	5.7	4.9	--	10.3	23.0	12.6	--	--	--
Misc. priv.-individual										
1-4 years	71.5	2.5	1.8	23.5	33.4	7.6	2.7	--	--	--
5-9 years	97.0	15.4	16.7	23.9	25.0	13.5	2.5	--	--	--
10-19 years	97.9	9.2	21.2	15.0	28.1	19.2	5.2	--	--	--
20+ years	56.5	5.0	7.7	7.3	21.3	12.9	2.3	--	--	--
All classes	322.9	32.1	47.4	69.7	107.8	53.2	12.7	--	--	--
All private owners										
1-4 years	155.1	8.2	9.4	42.4	55.9	26.6	12.6	--	--	--
5-9 years	214.9	20.7	16.7	51.2	66.2	41.2	13.6	5.3	--	--
10-19 years	270.5	21.9	26.3	60.9	80.7	63.2	14.8	2.7	--	--
20+ years	183.7	10.2	15.4	47.3	75.3	30.4	5.1	--	--	--
All classes	824.2	61.0	67.8	201.8	278.1	161.4	46.1	8.0	--	--

Table 7.--Area of commercial forest land by forest type, stand-size class, and ownership class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Jack pine										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	2.7	--	--	--	--	--	--	2.7	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	2.7	--	--	--	--	--	--	2.7	--	--
Red pine										
Sawtimber	2.2	--	--	2.2	--	--	--	--	--	--
Poletimber	5.0	--	--	--	--	--	--	--	2.4	2.6
Sapling & seedling	5.0	--	--	--	--	--	--	--	--	5.0
All stands	12.2	--	--	2.2	--	--	--	--	2.4	7.6
White pine										
Sawtimber	4.9	--	--	--	--	--	--	4.9	--	--
Poletimber	8.7	--	--	1.8	--	--	--	2.4	--	4.5
Sapling & seedling	2.8	--	--	--	--	--	--	--	--	2.8
All stands	16.4	--	--	1.8	--	--	--	7.3	--	7.3
Balsam fir										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--
White spruce										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	2.2	--	--	--	--	--	--	--	--	2.2
Sapling & seedling	2.8	--	--	--	--	--	--	--	--	2.8
All stands	5.0	--	--	--	--	--	--	--	--	5.0
Black spruce										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.7	--	--	--	--	--	--	2.7	--	--
All stands	2.7	--	--	--	--	--	--	2.7	--	--
Northern white-cedar										
Sawtimber	24.0	--	--	5.4	--	--	--	--	2.6	16.0
Poletimber	18.2	--	--	--	--	--	2.5	10.3	--	5.4
Sapling & seedling	11.4	--	--	--	--	--	--	8.7	--	2.7
All stands	53.6	--	--	5.4	--	--	2.5	19.0	2.6	24.1

(Table 7 continued on next page)

(Table 7 continued)

Forest type and stand-size class	All owners	Ownership class: National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Tamarack										
Sawtimber	2.1	--	--	2.1	--	--	--	--	--	--
Poletimber	4.6	--	--	--	2.3	--	--	2.3	--	--
Sapling & seedling	2.5	--	--	--	--	--	--	--	2.5	--
All stands	9.2	--	--	2.1	2.3	--	--	2.3	2.5	--
Oak-hickory										
Sawtimber	237.6	--	--	10.3	--	--	--	130.1	17.4	79.8
Poletimber	31.8	--	--	2.1	3.2	--	2.5	16.4	--	7.6
Sapling & seedling	23.4	--	--	5.6	--	--	--	5.4	--	12.4
All stands	292.8	--	--	18.0	3.2	--	2.5	151.9	17.4	99.8
Elm-ash-soft maple										
Sawtimber	77.2	--	2.1	8.5	7.4	--	5.2	30.5	7.5	16.0
Poletimber	83.1	--	--	8.2	--	--	--	42.5	--	32.4
Sapling & seedling	40.2	--	--	4.6	--	--	5.3	16.7	5.9	7.7
All stands	200.5	--	2.1	21.3	7.4	--	10.5	89.7	13.4	56.1
Maple-birch										
Sawtimber	133.6	--	--	2.7	--	--	--	70.7	7.4	52.8
Poletimber	56.6	--	--	2.3	--	--	--	27.1	2.5	24.7
Sapling & seedling	43.7	--	--	--	--	--	--	30.5	--	13.2
All stands	233.9	--	--	5.0	--	--	--	128.3	9.9	90.7
Aspen										
Sawtimber	10.9	--	--	--	--	--	--	5.4	--	5.5
Poletimber	23.4	--	2.5	5.0	--	--	--	2.8	5.6	7.5
Sapling & seedling	29.0	--	--	6.7	--	--	--	12.2	2.7	7.4
All stands	63.3	--	2.5	11.7	--	--	--	20.4	8.3	20.4
Paper birch										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	3.3	--	--	--	--	--	--	--	--	3.3
Sapling & seedling	5.0	--	--	--	--	--	--	2.5	--	2.5
All stands	8.3	--	--	--	--	--	--	2.5	--	5.8
Exotic										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--
Nonstocked	8.6	--	--	--	--	--	--	2.5	--	6.1
All types										
Sawtimber	492.5	--	2.1	31.2	7.4	--	5.2	241.6	34.9	170.1
Poletimber	239.6	--	2.5	19.4	5.5	--	5.0	106.5	10.5	90.2
Sapling & seedling	168.5	--	--	16.9	--	--	5.3	78.7	11.1	56.5
Nonstocked	8.6	--	--	--	--	--	--	2.5	--	6.1
All stands	909.2	--	4.6	67.5	12.9	--	15.5	429.3	56.5	322.9

Table 8.--Area of commercial forest land by forest type and county, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All counties	County											
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Jack pine	2.7	--	--	--	2.7	--	--	--	--	--	--	--	--
Red pine	12.2	--	--	7.4	--	--	--	2.2	--	--	2.6	--	--
White pine	16.4	--	--	--	--	2.3	2.8	--	2.4	2.4	--	1.8	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	5.0	--	--	--	--	--	2.8	--	--	--	--	--	--
Black spruce	2.7	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	53.6	--	--	--	--	--	29.7	--	--	--	--	--	5.2
Tamarack	9.2	--	--	--	--	--	--	2.1	--	2.3	--	--	--
Oak-hickory	292.8	4.9	2.5	49.6	68.4	4.5	2.7	8.6	18.9	14.0	10.7	7.2	--
Elm-ash-soft maple	200.5	10.0	9.8	2.5	2.8	9.2	24.5	8.4	4.8	--	--	--	21.1
Maple-birch	233.9	27.5	12.4	12.4	5.4	9.4	29.8	10.5	4.8	2.3	15.7	1.8	10.5
Aspen	63.3	5.0	--	12.3	10.9	2.2	11.2	2.1	--	--	--	--	--
Paper birch	8.3	--	--	--	--	--	--	--	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	8.6	--	--	--	--	--	2.8	--	--	--	--	--	--
All types	909.2	47.4	24.7	84.2	90.2	27.6	106.3	33.9	30.9	21.0	29.0	10.8	36.8

Forest type	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--
White pine	--	--	2.5	--	--	--	2.2	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	2.2	--	--	--	--
Black spruce	2.7	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	8.1	--	5.1	--	--	--	2.2	--	3.3	--	--
Tamarack	--	--	2.5	--	--	--	2.3	--	--	--	--
Oak-hickory	2.7	--	2.5	--	6.8	21.9	6.7	30.5	6.5	20.3	2.9
Elm-ash-soft maple	18.8	--	30.3	3.2	3.4	2.5	17.9	--	19.7	8.8	2.8
Maple-birch	21.5	--	15.3	9.8	3.3	2.5	15.8	5.1	9.6	--	8.5
Aspen	2.7	--	5.0	--	3.4	--	2.2	--	3.3	3.0	--
Paper birch	--	--	5.0	3.3	--	--	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	--	--	2.5	--	--	--	--	--	3.3	--	--
All types	56.5	--	70.7	16.3	16.9	26.9	51.5	35.6	45.7	32.1	14.2

Table 9.--Area of commercial forest land by county and stand-size class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

County	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Brown	47.4	27.4	10.0	10.0	--
Calumet	24.7	9.9	9.9	4.9	--
Columbia	84.2	37.1	29.8	17.3	--
Dane	90.2	73.8	11.0	5.4	--
Dodge	27.6	16.0	4.6	7.0	--
Door	106.3	37.9	30.1	35.5	2.8
Fond du Lac	33.9	21.2	4.2	8.5	--
Green	30.9	26.1	4.8	--	--
Green Lake	21.0	9.4	11.6	--	--
Jefferson	29.0	23.8	2.6	2.6	--
Kenosha	10.8	5.4	5.4	--	--
Kewaunee	36.8	23.7	13.1	--	--
Manitowoc	56.5	32.4	16.1	8.0	--
Outagamie	70.7	27.9	25.0	15.3	2.5
Ozaukee	16.3	3.2	6.6	6.5	--
Racine	16.9	6.8	--	10.1	--
Rock	26.9	19.5	4.9	2.5	--
Sheboygan	51.5	13.6	24.5	13.4	--
Walworth	35.6	35.6	--	--	--
Washington	45.7	12.9	19.6	9.9	3.3
Waukesha	32.1	20.3	3.0	8.8	--
Winnebago	14.2	8.6	2.8	2.8	--
All counties	909.2	492.5	239.6	168.5	8.6

Table 10.--Area of commercial forest land by forest type, stand-size class, and site class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Jack pine							
Sawtimber	--	--	--	--	--	--	--
Poletimber	2.7	--	--	--	--	--	2.7
Sapling & seedling	--	--	--	--	--	--	--
All stands	2.7	--	--	--	--	--	2.7
Red pine							
Sawtimber	2.2	--	--	--	2.2	--	--
Poletimber	5.0	--	--	--	5.0	--	--
Sapling & seedling	5.0	--	--	--	2.5	2.5	--
All stands	12.2	--	--	--	9.7	2.5	--
White pine							
Sawtimber	4.9	--	--	4.9	--	--	--
Poletimber	8.7	--	--	1.8	4.5	--	2.4
Sapling & seedling	2.8	--	--	--	--	2.8	--
All stands	16.4	--	--	6.7	4.5	2.8	2.4
Balsam fir							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
White spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	2.2	--	--	--	2.2	--	--
Sapling & seedling	2.8	--	--	--	--	--	2.8
All stands	5.0	--	--	--	2.2	--	2.8
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	2.7	--	--	--	--	--	2.7
All stands	2.7	--	--	--	--	--	2.7
Northern white-cedar							
Sawtimber	24.0	--	--	--	2.7	7.9	13.4
Poletimber	18.2	--	--	--	--	7.6	10.6
Sapling & seedling	11.4	--	--	--	--	6.0	5.4
All stands	53.6	--	--	--	2.7	21.5	29.4

(Table 10 continued on next page)

(Table 10 continued)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Tamarack							
Sawtimber	2.1	--	--	--	--	2.1	--
Poletimber	4.6	--	--	--	--	4.6	--
Sapling & seedling	2.5	--	--	--	--	2.5	--
All stands	9.2	--	--	--	--	9.2	--
Oak-hickory							
Sawtimber	237.6	--	--	--	30.1	96.1	111.4
Poletimber	31.8	--	--	--	7.5	16.9	7.4
Sapling & seedling	23.4	--	--	--	2.2	10.2	11.0
All stands	292.8	--	--	--	39.8	123.2	129.8
Elm-ash-soft maple							
Sawtimber	77.2	--	--	--	17.7	22.9	36.6
Poletimber	83.1	--	--	--	17.5	28.7	36.9
Sapling & seedling	40.2	--	--	--	--	15.5	24.7
All stands	200.5	--	--	--	35.2	67.1	98.2
Maple-birch							
Sawtimber	133.6	--	--	5.2	35.0	61.3	32.1
Poletimber	56.6	--	--	5.3	8.4	25.9	17.0
Sapling & seedling	43.7	--	--	2.3	9.1	9.7	22.6
All stands	233.9	--	--	12.8	52.5	96.9	71.7
Aspen							
Sawtimber	10.9	--	--	--	8.1	2.8	--
Poletimber	23.4	--	--	2.5	13.1	2.5	5.3
Sapling & seedling	29.0	--	--	--	4.3	18.3	6.4
All stands	63.3	--	--	2.5	25.5	23.6	11.7
Paper birch							
Sawtimber	--	--	--	--	--	--	--
Poletimber	3.3	--	--	--	--	3.3	--
Sapling & seedling	5.0	--	--	--	--	2.5	2.5
All stands	8.3	--	--	--	--	5.8	2.5
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	8.6	--	--	--	--	2.8	5.8
All types							
Sawtimber	492.5	--	--	10.1	95.8	193.1	193.5
Poletimber	239.6	--	--	9.6	58.2	89.5	82.3
Sapling & seedling	168.5	--	--	2.3	18.1	70.0	78.1
Nonstocked	8.6	--	--	--	--	2.8	5.8
All stands	909.2	--	--	22.0	172.1	355.4	359.7

Table 11.--Area of commercial forest land by forest type and stand-age class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	2.7	--	--	--	2.7	--	--	--	--	--	--	--	--	--
Red pine	12.2	--	10.0	--	2.2	--	--	--	--	--	--	--	--	--
White pine	16.4	2.8	2.3	4.0	--	4.9	--	--	--	2.4	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	5.0	2.8	--	--	2.2	--	--	--	--	--	--	--	--	--
Black spruce	2.7	--	2.7	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	53.6	3.3	5.4	--	5.4	5.4	4.9	2.7	2.7	5.3	7.8	8.0	2.7	--
Tamarack	9.2	--	2.5	--	2.3	2.3	--	2.1	--	--	--	--	--	--
Oak-hickory	292.8	7.2	16.2	8.0	7.6	15.4	26.0	11.5	33.1	22.5	30.9	31.1	37.8	45.5
Elm-ash-soft maple	200.5	16.3	20.4	28.4	27.2	27.9	15.5	15.0	24.4	7.4	5.5	7.8	4.7	--
Maple-birch	233.9	21.0	22.7	20.5	15.8	10.5	30.8	24.0	23.3	13.4	24.9	12.9	11.4	2.7
Aspen	63.3	12.2	13.4	11.2	12.8	5.6	2.7	2.7	2.7	--	--	--	--	--
Paper birch	8.3	5.0	--	--	3.3	--	--	--	--	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	8.6	8.6	--	--	--	--	--	--	--	--	--	--	--	--
All types	909.2	79.2	95.6	72.1	81.5	72.0	79.9	58.0	86.2	51.0	69.1	59.8	56.6	48.2

Table 12.--Area of commercial forest land by forest type and site-index class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All classes	Site-index class (feet)								
		11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
Jack pine	2.7	--	--	--	--	2.7	--	--	--	--
Red pine	12.2	--	--	--	--	--	2.2	10.0	--	--
White pine	16.4	--	--	2.4	--	2.8	2.2	6.6	2.4	--
Balsam fir	--	--	--	--	--	--	--	--	--	--
White spruce	5.0	--	--	2.8	--	--	--	2.2	--	--
Black spruce	2.7	--	--	--	2.7	--	--	--	--	--
Northern white-cedar	53.6	--	10.6	16.1	8.0	11.3	4.9	2.7	--	--
Tamarack	9.2	--	--	--	--	--	9.2	--	--	--
Oak-hickory	292.8	--	--	24.5	64.8	75.4	64.8	38.5	19.8	5.0
Elm-ash-soft maple	200.5	--	5.4	11.1	24.4	34.4	35.9	54.1	22.9	12.3
Maple-birch	233.9	--	--	2.5	12.4	56.8	61.2	52.3	31.0	17.7
Aspen	63.3	--	--	2.8	3.4	7.9	16.0	25.5	5.2	2.5
Paper birch	8.3	--	--	--	2.5	--	5.8	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	8.6	--	--	--	3.3	5.3	--	--	--	--
All types	909.2	--	16.0	62.2	121.5	196.6	202.2	191.9	81.3	37.5

Table 13.--Area of commercial forest land by forest type, stand-size class, and basal-area class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	2.7	--	--	--	--	--	--	--	--	2.7	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	2.7	--	--	--	--	--	--	--	--	2.7	--	--	--	--	--
Red pine															
Sawtimber	2.2	--	--	--	--	--	--	--	--	--	--	--	--	2.2	--
Poletimber	5.0	--	--	--	--	--	--	2.4	--	2.6	--	--	--	--	--
Sapling & seedling	5.0	--	--	2.5	--	--	--	--	--	--	--	--	2.5	--	--
All stands	12.2	--	--	2.5	--	--	--	2.4	--	2.6	--	--	2.5	2.2	--
White pine															
Sawtimber	4.9	--	--	--	2.4	--	--	--	--	--	--	--	2.5	--	--
Poletimber	8.7	--	--	--	--	--	--	--	1.8	--	2.4	4.5	--	--	--
Sapling & seedling	2.8	2.8	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	16.4	2.8	--	--	2.4	--	--	--	1.8	--	2.4	4.5	2.5	--	--
Balsam fir															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	2.2	--	--	--	--	--	--	--	--	--	2.2	--	--	--	--
Sapling & seedling	2.8	--	2.8	--	--	--	--	--	--	--	--	--	--	--	--
All stands	5.0	--	2.8	--	--	--	--	--	--	--	2.2	--	--	--	--
Black spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.7	--	--	--	--	--	--	2.7	--	--	--	--	--	--	--
All stands	2.7	--	--	--	--	--	--	2.7	--	--	--	--	--	--	--
Northern white-cedar															
Sawtimber	24.0	--	--	--	--	5.3	--	--	2.6	--	--	--	8.1	2.7	5.3
Poletimber	18.2	--	--	--	--	--	--	--	--	2.7	--	2.7	2.7	10.1	--
Sapling & seedling	11.4	--	--	3.3	--	--	--	--	2.7	2.7	--	2.7	--	--	--
All stands	53.6	--	--	3.3	--	5.3	--	--	5.3	5.4	--	5.4	10.8	12.8	5.3

(Table 13 continued on next page)

(Table 13 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	2.1	--	--	2.1	--	--	--	--	--	--	--	--	--	--	--
Poletimber	4.6	--	--	--	--	--	2.3	--	--	2.3	--	--	--	--	--
Sapling & seedling	2.5	--	2.5	--	--	--	--	--	--	--	--	--	--	--	--
All stands	9.2	--	2.5	2.1	--	--	2.3	--	--	2.3	--	--	--	--	--
Oak-hickory															
Sawtimber	237.6	--	2.4	2.1	2.5	14.9	9.8	20.4	30.8	38.3	23.6	56.6	23.5	12.7	--
Poletimber	31.8	--	--	--	--	--	2.5	--	4.5	7.8	7.4	5.3	4.3	--	--
Sapling & seedling	23.4	2.7	5.2	2.5	2.9	5.0	2.2	--	--	--	--	2.9	--	--	--
All stands	292.8	2.7	7.6	4.6	5.4	19.9	14.5	20.4	35.3	46.1	31.0	64.8	27.8	12.7	--
Elm-ash-soft maple															
Sawtimber	77.2	--	--	6.9	10.1	2.5	10.6	2.8	10.3	2.3	11.2	13.3	--	2.5	4.7
Poletimber	83.1	--	7.7	17.6	5.8	5.0	7.7	4.9	2.5	5.3	4.9	5.8	4.9	11.0	--
Sapling & seedling	40.2	--	7.8	2.2	12.0	7.7	--	5.3	2.7	2.5	--	--	--	--	--
All stands	200.5	--	15.5	26.7	27.9	15.2	18.3	13.0	15.5	10.1	16.1	19.1	4.9	13.5	4.7
Maple-birch															
Sawtimber	133.6	--	--	--	2.6	7.7	10.1	5.4	22.2	16.3	18.2	18.4	20.6	6.7	5.4
Poletimber	56.6	--	--	2.5	--	5.7	5.6	--	7.4	5.1	10.5	10.1	6.9	2.8	--
Sapling & seedling	43.7	2.5	2.8	2.2	2.2	4.8	3.3	2.3	8.1	12.7	--	2.8	--	--	--
All stands	233.9	2.5	2.8	4.7	4.8	18.2	19.0	7.7	37.7	34.1	28.7	31.3	27.5	9.5	5.4
Aspen															
Sawtimber	10.9	--	--	--	--	--	2.7	--	--	--	2.8	5.4	--	--	--
Poletimber	23.4	--	--	5.3	--	2.8	2.5	--	2.8	2.5	7.5	--	--	--	--
Sapling & seedling	29.0	2.4	2.1	2.7	2.4	8.0	--	6.4	--	2.8	2.2	--	--	--	--
All stands	63.3	2.4	2.1	8.0	2.4	10.8	5.2	6.4	2.8	5.3	12.5	5.4	--	--	--
Paper birch															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	3.3	--	--	--	--	--	--	--	--	--	--	3.3	--	--	--
Sapling & seedling	5.0	--	5.0	--	--	--	--	--	--	--	--	--	--	--	--
All stands	8.3	--	5.0	--	--	--	--	--	--	--	--	3.3	--	--	--
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	8.6	2.8	5.8	--	--	--	--	--	--	--	--	--	--	--	--
All types															
Sawtimber	492.5	--	2.4	11.1	17.6	30.4	33.2	28.6	65.9	56.9	55.8	93.7	54.7	26.8	15.4
Poletimber	239.6	--	7.7	25.4	5.8	13.5	20.6	7.3	19.0	31.0	34.9	31.7	18.8	23.9	--
Sapling & seedling	168.5	10.4	28.2	15.4	19.5	25.5	5.5	16.7	13.5	20.7	2.2	8.4	2.5	--	--
Nonstocked	8.6	2.8	5.8	--	--	--	--	--	--	--	--	--	--	--	--
All stands	909.2	13.2	44.1	51.9	42.9	69.4	59.3	52.6	98.4	108.6	92.9	133.8	76.0	50.7	15.4

Table 14.--Area of commercial forest land by stocking class of growing-stock trees and stand-size class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Stocking class (percent)	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Less than 16.7	8.6	--	--	--	8.6
16.7 to 60.9	280.2	154.3	70.4	55.5	--
61.0 to 100.9	398.2	234.5	108.3	55.4	--
101.0 to 133.9	196.2	93.2	50.6	52.4	--
134.0+	26.0	10.5	10.3	5.2	--
All classes	909.2	492.5	239.6	168.5	8.6

Table 15.--Area of commercial forest land in plantations by forest type and stand-age class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	2.7	--	--	--	2.7	--	--	--	--	--	--	--	--	--
Red pine	12.2	--	10.0	--	2.2	--	--	--	--	--	--	--	--	--
White pine	11.7	2.8	--	4.0	--	4.9	--	--	--	--	--	--	--	--
White spruce	2.2	--	--	--	2.2	--	--	--	--	--	--	--	--	--
Black spruce	2.7	--	2.7	--	--	--	--	--	--	--	--	--	--	--
All types	31.5	2.8	12.7	4.0	7.1	4.9	--	--	--	--	--	--	--	--

Table 16.--Area of commercial forest land with conifer understory by forest type and conifer understory species, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All species	Conifer understory species									
		White pine	Red pine	Jack pine	Balsam fir	White spruce	Black spruce	Hemlock	Northern white-cedar	Eastern redcedar	Other softwoods
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--
White pine	2.8	2.8	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
White spruce	2.8	2.8	--	--	--	--	--	--	--	--	--
Black spruce	2.7	--	--	--	--	--	2.7	--	--	--	--
Northern white-cedar	29.1	--	--	--	8.0	--	--	--	21.1	--	--
Tamarack	7.1	--	--	--	--	--	--	--	2.3	--	4.8
Oak-hickory	35.0	5.3	2.5	2.5	--	--	--	--	2.7	22.0	--
Elm-ash-soft maple	23.9	--	--	--	--	--	2.7	--	18.4	2.8	--
Maple-birch	16.4	--	2.8	--	2.7	5.8	--	2.7	2.4	--	--
Aspen	5.6	--	--	--	5.6	--	--	--	--	--	--
Paper birch	--	--	--	--	--	--	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--	--	--	--	--	--
All types	125.4	10.9	5.3	2.5	16.3	5.8	5.4	2.7	46.9	24.8	4.8

Table 17.--Area of noncommercial forest land by ownership class, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All areas	Unproductive areas	Productive-reserved areas
National Forest	--	--	--
Miscellaneous federal	--	--	--
State	18.6	--	18.6
County and municipal	3.3	--	3.3
Indian	--	--	--
Forest industry	--	--	--
Farmer	2.7	--	2.7
Misc. private-corp.	--	--	--
Misc. private-indiv.	3.7	2.9	0.8
Total	28.3	2.9	25.4

Table 18.--Area of noncommercial forest land by forest type, Southeast Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All areas	Unproductive areas	Productive-reserved areas
Jack pine	--	--	--
Red pine	1.1	--	1.1
White pine	2.7	--	2.7
Balsam fir	--	--	--
White spruce	--	--	--
Black spruce	--	--	--
Northern white-cedar	--	--	--
Tamarack	--	--	--
Oak-hickory	6.3	--	6.3
Elm-ash-soft maple	5.5	2.9	2.6
Maple-birch	9.6	--	9.6
Aspen	3.1	--	3.1
Paper birch	--	--	--
Exotic	--	--	--
Nonstocked	--	--	--
All types	28.3	2.9	25.4

Table 19.--Number of all live trees on commercial forest land by species group and diameter class, Southeast Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	1,240	242	242	629	64	44	19	--	--	--	--	--	--	--	--
Red pine	5,895	242	1,954	2,064	952	586	71	26	--	--	--	--	--	--	--
White pine	10,365	4,616	3,014	1,522	746	125	129	102	56	20	20	6	9	--	--
White spruce	1,658	568	284	477	169	102	34	21	--	--	--	--	3	--	--
Black spruce	1,632	527	788	250	67	--	--	--	--	--	--	--	--	--	--
Balsam fir	5,754	2,657	2,655	316	92	22	12	--	--	--	--	--	--	--	--
Hemlock	1,015	263	--	426	198	68	41	13	--	6	--	--	--	--	--
Tamarack	4,885	1,995	1,558	363	704	94	133	8	7	19	4	--	--	--	--
Eastern redcedar	6,493	4,433	1,055	831	140	19	--	--	15	--	--	--	--	--	--
Northern white-cedar	50,882	28,382	6,357	8,157	4,422	2,258	806	358	106	20	11	3	2	--	--
Other softwoods	94	--	--	41	53	--	--	--	--	--	--	--	--	--	--
Total	89,913	43,925	17,907	15,076	7,607	3,318	1,245	528	184	65	35	9	14	--	--
Hardwoods															
White oak	15,150	5,431	1,694	1,317	1,116	990	1,071	1,072	718	599	419	299	310	103	11
Select red oak	10,331	3,185	3,411	179	917	441	457	441	342	307	198	196	202	53	2
Other red oak	15,079	8,364	996	2,230	834	685	442	592	389	186	178	98	74	10	1
Select hickory	18,143	11,437	2,310	1,334	1,046	849	658	257	146	81	19	--	6	--	--
Other hickory	7,227	4,543	1,048	1,159	208	109	113	14	33	--	--	--	--	--	--
Basswood	23,375	17,995	2,890	816	407	463	197	229	122	71	78	37	48	22	--
Beech	4,480	2,305	1,036	196	168	184	251	138	50	88	25	31	8	--	--
Yellow birch	2,837	513	456	1,084	239	318	122	75	14	12	--	4	--	--	--
Hard maple	23,360	12,491	4,136	2,716	1,247	764	838	341	294	139	146	98	97	49	4
Soft maple	19,884	10,823	3,560	2,251	773	902	511	337	294	186	72	95	48	27	5
Elm	35,842	21,778	6,671	2,912	2,117	1,097	582	289	211	64	72	7	30	11	1
Black ash	23,870	13,011	3,818	3,424	2,201	897	346	75	79	14	5	--	--	--	--
White & green ash	46,353	32,619	5,878	2,264	2,005	1,603	974	492	256	108	60	10	69	15	--
Cottonwood	319	--	--	--	163	64	51	19	--	6	5	--	2	5	4
Willow	5,078	3,344	456	562	222	69	96	62	88	78	37	23	31	10	--
Hackberry	268	237	--	--	--	--	15	11	--	--	--	--	5	--	--
Balsam poplar	700	266	266	--	--	70	--	40	32	10	7	5	4	--	--
Bigtooth aspen	5,577	3,632	--	650	289	283	447	208	59	7	--	--	--	2	--
Quaking aspen	30,963	15,605	6,777	4,639	1,984	1,133	491	215	90	21	8	--	--	--	--
Paper birch	17,497	9,725	4,257	991	1,544	625	235	70	38	12	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	27,273	16,263	5,778	2,002	1,091	802	583	429	162	80	47	17	19	--	--
Black walnut	1,702	953	--	448	85	16	43	74	16	54	13	--	--	--	--
Butternut	1,359	1,082	--	--	129	88	13	28	7	--	8	4	--	--	--
Other hardwoods	15,953	7,814	4,172	2,102	1,059	390	185	122	56	48	--	--	3	2	--
Noncommercial species	42,328	28,831	8,747	3,210	1,129	304	107	--	--	--	--	--	--	--	--
Total	394,948	232,247	68,357	36,486	20,973	13,146	8,828	5,630	3,496	2,171	1,397	924	956	309	28
All species	484,861	276,172	86,264	51,562	28,580	16,464	10,073	6,158	3,680	2,236	1,432	933	970	309	28

Table 20.--Number of growing-stock trees on commercial forest land by species group and diameter class, Southeast Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	1,240	242	242	629	64	44	19	--	--	--	--	--	--	--	--
Red pine	5,826	242	1,954	2,064	910	559	71	26	--	--	--	--	--	--	--
White pine	10,265	4,616	3,014	1,471	699	125	129	102	56	20	20	6	7	--	--
White spruce	1,658	568	284	477	169	102	34	21	--	--	--	--	3	--	--
Black spruce	1,632	527	788	250	67	--	--	--	--	--	--	--	--	--	--
Balsam fir	5,754	2,657	2,655	316	92	22	12	--	--	--	--	--	--	--	--
Hemlock	894	263	--	375	141	68	28	13	--	6	--	--	--	--	--
Tamarack	4,856	1,995	1,558	363	704	65	133	8	7	19	4	--	--	--	--
Eastern redcedar	5,803	4,191	774	725	98	--	--	--	15	--	--	--	--	--	--
Northern white-cedar	48,570	28,119	6,094	7,185	4,144	1,919	696	316	77	20	--	--	--	--	--
Other softwoods	94	--	--	41	53	--	--	--	--	--	--	--	--	--	--
Total	86,592	43,420	17,363	13,896	7,141	2,904	1,122	486	155	65	24	6	10	--	--
Hardwoods															
White oak	12,846	5,431	1,452	1,020	726	817	761	812	522	477	325	228	204	61	10
Select red oak	9,689	3,185	3,411	179	635	406	364	391	288	307	174	153	160	34	2
Other red oak	12,820	8,122	754	1,281	714	540	362	392	260	152	105	88	42	8	--
Select hickory	17,259	11,437	2,310	848	981	746	550	184	108	70	19	--	6	--	--
Other hickory	7,125	4,543	1,048	1,103	208	96	80	14	33	--	--	--	--	--	--
Basswood	22,591	17,995	2,653	548	373	414	182	201	56	65	34	24	31	15	--
Beech	4,157	2,305	1,036	196	111	131	166	82	17	76	10	22	5	--	--
Yellow birch	2,549	513	456	1,019	209	253	58	22	14	5	--	--	--	--	--
Hard maple	22,492	12,491	4,136	2,402	1,112	718	772	251	217	104	117	69	84	19	--
Soft maple	18,652	10,823	3,299	2,016	664	639	398	288	232	130	58	59	30	15	1
Elm	32,943	20,910	6,197	2,258	1,701	877	453	246	160	50	56	3	23	8	1
Black ash	22,220	12,479	3,023	3,424	2,122	693	324	75	72	8	--	--	--	--	--
White & green ash	44,821	32,353	5,636	1,789	1,942	1,396	869	406	217	93	55	10	44	11	--
Cottonwood	173	--	--	--	53	64	25	9	--	6	5	--	2	5	4
Willow	4,279	3,344	228	235	142	23	81	34	75	68	25	10	14	--	--
Hackberry	268	237	--	--	--	--	15	11	--	--	--	--	5	--	--
Balsam poplar	686	266	266	--	--	70	--	40	32	--	7	5	--	--	--
Bigtooth aspen	5,115	3,632	--	394	184	283	422	149	42	7	--	--	--	2	--
Quaking aspen	29,102	15,346	6,251	4,270	1,652	962	385	137	70	21	8	--	--	--	--
Paper birch	16,894	9,347	4,257	991	1,376	625	190	70	38	--	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	24,787	15,776	5,016	1,788	768	541	404	270	110	64	34	5	11	--	--
Black walnut	1,568	953	--	378	53	16	31	62	16	54	5	--	--	--	--
Butternut	1,320	1,082	--	--	107	88	13	11	7	--	8	4	--	--	--
Other hardwoods	12,960	7,572	3,268	1,437	356	221	52	37	9	8	--	--	--	--	--
Total	327,316	200,142	54,697	27,576	16,189	10,619	6,957	4,194	2,595	1,765	1,045	680	661	178	18
All species	413,908	243,562	72,060	41,472	23,330	13,523	8,079	4,680	2,750	1,830	1,069	686	671	178	18

Table 21.--Net volume of growing stock on commercial forest land by species group, Southeast Unit, Wisconsin, 1968 and 1983

(In thousand cubic feet)

Species group	1968[1/]	1983
Softwoods		
Jack pine	849	2,629
Red pine	2,442	19,687
White pine	4,671	16,386
White spruce	955	4,425
Black spruce	106	827
Balsam fir	1,805	1,989
Hemlock	4,458	2,506
Tamarack	7,325	10,043
Eastern redcedar	106	2,089
Northern white-cedar	54,883	75,064
Other softwoods	--	341
Total	77,600	135,986
Hardwoods		
White oak	72,950	109,832
Select red oak	72,373	76,541
Other red oak	32,678	49,150
Select hickory	24,509	34,079
Other hickory	2,499	8,197
Basswood	19,223	27,278
Beech	11,726	12,848
Yellow birch	3,844	6,990
Hard maple	44,885	68,998
Soft maple	33,159	54,651
Elm	101,495	43,684
Black ash	24,509	41,553
White and green ash	37,676	72,123
Cottonwood	4,998	4,426
Willow	5,478	12,161
Hackberry	288	843
Balsam poplar	3,941	3,286
Bigtooth aspen	12,879	19,159
Quaking aspen	39,599	46,395
Paper birch	16,435	23,223
River birch	--	--
Black cherry	15,570	38,345
Black walnut	2,307	6,156
Butternut	961	2,633
Other hardwoods	2,018	9,646
Total	586,000	772,197
All species	663,600	908,183

[1/] 1968 growing-stock volumes have been adjusted from those published after the 1968 survey to conform to 1983 volumes because of changes in volume equations.

Table 22.--Net volume of all live trees on commercial forest land by species group and diameter class, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	2,629	1,647	292	453	237	--	--	--	--	--	--	--	--
Red pine	20,104	7,050	5,525	5,678	1,227	624	--	--	--	--	--	--	--
White pine	16,710	2,440	2,946	1,060	2,046	2,705	1,945	1,019	1,290	445	814	--	--
White spruce	4,425	1,129	915	1,091	562	503	--	--	--	--	225	--	--
Black spruce	827	448	379	--	--	--	--	--	--	--	--	--	--
Balsam fir	1,989	891	645	181	272	--	--	--	--	--	--	--	--
Hemlock	2,814	731	778	558	461	131	--	155	--	--	--	--	--
Tamarack	10,268	1,333	4,407	827	2,371	169	171	810	180	--	--	--	--
Eastern redcedar	2,464	1,588	490	92	--	--	294	--	--	--	--	--	--
Northern white-cedar	82,960	20,119	22,217	18,773	10,411	7,269	2,718	786	312	174	181	--	--
Other softwoods	341	101	240	--	--	--	--	--	--	--	--	--	--
Total	145,531	37,477	38,834	28,713	17,587	11,401	5,128	2,770	1,782	619	1,220	--	--
Hardwoods													
White oak	144,788	2,914	5,236	7,641	12,985	18,345	16,834	18,588	16,023	14,535	19,590	9,991	2,106
Select red oak	88,430	596	5,376	4,470	6,687	9,151	9,687	11,414	8,860	10,963	14,705	6,118	403
Other red oak	67,874	4,392	4,416	5,947	6,127	11,149	10,729	6,556	7,680	5,091	4,563	1,064	160
Select hickory	40,445	4,521	6,049	7,929	9,059	4,915	3,745	2,974	879	--	374	--	--
Other hickory	8,801	3,718	1,315	937	1,610	318	903	--	--	--	--	--	--
Basswood	34,884	2,173	2,528	4,435	3,070	5,013	3,515	2,929	3,605	1,970	3,400	2,246	--
Beech	17,475	617	898	1,958	3,857	2,376	1,242	3,135	1,012	1,741	639	--	--
Yellow birch	9,674	1,594	1,163	2,824	1,693	1,271	510	406	--	213	--	--	--
Hard maple	82,512	8,427	7,372	7,525	13,079	7,094	8,352	5,328	6,595	5,748	7,805	4,933	254
Soft maple	69,191	7,716	4,705	8,527	7,997	7,518	8,893	6,935	3,448	5,150	3,527	3,677	1,098
Elm	53,978	4,187	9,343	9,670	8,147	5,778	5,872	2,440	3,446	446	2,751	1,626	272
Black ash	43,976	13,686	13,439	8,040	4,902	1,448	2,015	367	79	--	--	--	--
White & green ash	81,401	6,715	11,985	15,738	14,899	10,328	7,247	3,989	2,844	637	5,385	1,634	--
Cottonwood	5,354	--	558	701	758	459	--	220	231	--	246	1,067	1,114
Willow	18,414	807	723	588	1,698	1,260	2,925	3,286	1,861	1,394	2,666	1,206	--
Hackberry	843	--	--	--	215	240	--	--	--	--	388	--	--
Balsam poplar	3,762	--	--	807	--	838	849	327	392	400	149	--	--
Bigtooth aspen	21,938	1,885	1,542	3,323	8,066	4,915	1,667	309	--	--	--	231	--
Quaking aspen	52,412	15,534	11,192	10,878	6,769	4,356	2,491	841	351	--	--	--	--
Paper birch	25,026	3,846	9,139	6,040	3,183	1,391	1,066	361	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	51,951	7,914	6,967	8,334	8,821	8,920	4,402	2,630	1,941	739	1,283	--	--
Black walnut	7,273	1,575	461	159	596	1,503	546	1,944	489	--	--	--	--
Butternut	3,116	--	772	925	179	515	247	--	243	235	--	--	--
Other hardwoods	19,536	5,802	4,631	3,032	1,942	1,813	1,114	988	--	--	57	157	--
Noncommercial species	13,914	5,881	4,656	2,141	1,236	--	--	--	--	--	--	--	--
Total	966,968	104,500	114,466	122,569	127,575	110,914	94,851	75,967	59,979	49,262	67,528	33,950	5,407
All species	1,112,499	141,977	153,300	151,282	145,162	122,315	99,979	78,737	61,761	49,881	68,748	33,950	5,407

Table 23.--Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Live trees			
Growing-stock trees			
Poletimber	354,787	72,342	282,445
Sawtimber			
Saw log portion	383,441	47,305	336,136
Upper stem portion	169,955	16,339	153,616
Subtotal	553,396	63,644	489,752
Total growing stock	908,183	135,986	772,197
Cull trees			
Rough and rotten cull tree			
Poletimber	63,059	3,969	59,090
Sawtimber	84,990	4,622	80,368
Subtotal	148,049	8,591	139,458
Short-log trees	56,267	954	55,313
Total cull	204,316	9,545	194,771
All live trees	1,112,499	145,531	966,968
Salvable dead trees			
Growing-stock trees	12,978	1,665	11,313
Cull trees	729	--	729
All salvable dead trees	13,707	1,665	12,042
All classes	1,126,206	147,196	979,010

Table 24.--Net volume of growing-stock, sawtimber, short-log, and rough and rotten trees on commercial forest land by individual species, Southeast Unit, Wisconsin 1983

Species	All live trees				Saw log-size trees		
	Total all live	Growing stock	Short-log cull	Rough and rotten cull	Total saw log	Sawtimber	Short-log
	-Thousand cubic feet-				-Thousand board feet[1/]		
Softwoods							
Jack pine	2,629	2,629	--	--	3,561	3,561	--
Red pine	20,104	19,687	--	417	41,833	41,833	--
White pine	16,710	16,386	--	324	57,630	57,630	--
White spruce	4,425	4,425	--	--	11,350	11,350	--
Black spruce	827	827	--	--	--	--	--
Balsam fir	1,989	1,989	--	--	2,000	2,000	--
Hemlock	2,814	2,506	--	308	5,006	5,006	--
Tamarack	10,268	10,043	--	225	23,041	23,041	--
Eastern redcedar	2,464	2,089	--	375	1,734	1,734	--
Northern white-cedar	82,960	75,064	954	6,942	182,542	179,244	3,298
Norway spruce	341	341	--	--	--	--	--
Total	145,531	135,986	954	8,591	328,697	325,399	3,298
Hardwoods							
White oak	92,113	71,950	9,015	11,148	346,690	323,357	23,333
Swamp white oak	9,793	8,486	752	555	37,701	35,769	1,932
Bur oak	42,882	29,396	3,881	9,605	140,524	130,585	9,939
Northern red oak	88,430	76,541	4,712	7,177	347,862	337,065	10,797
Northern pin oak	11,944	7,581	201	4,162	17,710	17,264	446
Black oak	55,930	41,569	7,350	7,011	180,984	164,153	16,831
Shagbark hickory	40,445	34,079	1,912	4,454	101,661	96,411	5,250
Bitternut hickory	8,801	8,197	--	604	12,407	12,407	--
American basswood	34,884	27,278	3,341	4,265	103,623	96,363	7,260
Beech	17,475	12,848	587	4,040	54,678	53,080	1,598
Yellow birch	9,674	6,990	207	2,477	9,797	9,302	495
Sugar maple	82,512	68,998	5,259	8,255	256,084	242,902	13,182
Red maple	65,627	52,874	4,335	8,418	183,324	172,081	11,243
Silver maple	3,564	1,777	463	1,324	9,193	7,997	1,196
American elm	39,898	32,537	1,463	5,898	86,534	82,716	3,818
Slippery elm	13,641	10,708	856	2,077	28,713	26,534	2,179
Rock elm	439	439	--	--	--	--	--
Black ash	43,976	41,553	156	2,267	50,037	49,617	420
White ash	34,010	30,759	670	2,581	100,370	98,896	1,474
Green ash	47,391	41,364	2,007	4,020	121,141	116,535	4,606
Eastern cottonwood	5,354	4,426	389	539	17,097	15,931	1,166
Black willow	18,414	12,161	1,889	4,364	52,097	46,317	5,780
Hackberry	843	843	--	--	3,841	3,841	--
Balsam poplar	3,762	3,286	327	149	12,233	11,434	799
Bigtooth aspen	21,938	19,159	1,121	1,658	63,588	61,791	1,797
Quaking aspen	52,412	46,395	428	5,589	61,666	60,688	978
Paper birch	25,026	23,223	--	1,803	26,361	26,361	--
River birch	--	--	--	--	--	--	--
Black cherry	51,951	38,345	2,742	10,864	117,775	110,756	7,019
Black walnut	7,273	6,156	320	797	24,637	23,844	793
Butternut	3,116	2,633	--	483	6,018	6,018	--
Boxelder	12,375	4,962	719	6,694	10,436	7,797	2,639
Northern catalpa	397	--	--	397	--	--	--
Red mulberry	1,157	205	--	952	--	--	--
Black locust	5,607	4,479	211	917	1,984	1,235	749
Total	953,054	772,197	55,313	125,544	2,586,766	2,449,047	137,719
All species[2/]	1,098,585	908,183	56,267	134,135	2,915,463	2,774,446	141,017

[1/] International 1/4-inch rule.

[2/] These totals do not include volume for noncommercial species. Volumes for individual noncommercial species are found in Table 25.

Table 25.--Net volume of noncommercial species on commercial forest land by individual species, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species	Cull volume
Hawthorn	1,839
Eastern hophornbeam	11,082
Chokecherry	993
All species	13,914

Table 26.--Net volume of growing stock on commercial forest land by species group and county, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All counties	County											
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Softwoods													
Jack pine	2,629	--	--	267	2,362	--	--	--	--	--	--	--	--
Red pine	19,687	--	--	3,774	--	--	--	6,903	--	511	4,987	--	--
White pine	16,386	--	--	777	250	1,116	1,055	--	1,470	1,285	--	743	433
White spruce	4,425	--	--	445	--	--	1,778	--	225	--	--	--	--
Black spruce	827	--	--	--	--	--	227	--	--	--	--	--	--
Balsam fir	1,989	--	--	--	--	--	1,989	--	--	--	--	--	--
Hemlock	2,506	207	--	--	--	--	736	--	--	--	--	--	1,409
Tamarack	10,043	--	--	252	923	--	1,022	685	--	2,265	--	--	1,327
Eastern redcedar	2,089	419	--	99	294	--	1,034	--	--	--	--	--	--
Northern white-cedar	75,064	215	2,772	--	--	--	37,951	--	--	--	--	--	12,983
Other softwoods	341	--	--	--	--	--	--	--	--	--	--	341	--
Total	135,986	841	2,772	5,614	3,829	1,116	45,792	7,588	1,695	4,061	4,987	1,084	16,152
Hardwoods													
White oak	109,832	1,431	--	19,715	25,192	2,114	--	3,661	5,183	4,274	8,629	2,074	--
Select red oak	76,541	4,224	432	11,855	7,349	1,174	2,109	2,447	4,303	3,833	6,530	1,134	305
Other red oak	49,150	--	--	20,475	15,811	--	--	2,994	552	2,421	240	77	--
Select hickory	34,079	--	393	1,089	4,444	--	--	1,345	1,657	2,021	3,557	1,564	--
Other hickory	8,197	--	222	368	2,439	4,189	--	--	218	--	--	89	526
Basswood	27,278	3,557	3,282	3,589	--	541	1,183	1,145	637	--	2,359	163	1,945
Beech	12,848	1,302	816	--	--	--	1,456	2,783	--	--	--	--	402
Yellow birch	6,990	866	679	--	--	--	1,062	--	--	--	--	--	2,440
Hard maple	68,998	7,727	841	--	--	350	16,110	4,288	2,982	--	6,118	--	5,213
Soft maple	54,651	12,798	802	274	1,657	1,559	3,124	1,119	--	1,626	--	--	5,290
Elm	43,684	4,697	817	1,581	1,803	947	3,672	2,812	5,745	93	2,461	111	928
Black ash	41,553	1,479	--	--	--	838	6,594	1,060	1,957	--	487	--	3,784
White & green ash	72,123	9,234	4,474	590	--	3,115	10,845	1,261	495	--	3,778	905	4,250
Cottonwood	4,426	--	--	269	231	--	--	822	1,408	--	--	--	--
Willow	12,161	374	--	--	--	--	789	1,677	--	--	--	--	2,006
Hackberry	843	--	--	455	--	--	--	--	--	--	388	--	--
Balsam poplar	3,286	--	--	--	--	--	2,702	--	--	--	--	--	--
Bigtooth aspen	19,159	1,791	--	2,071	3,123	686	4,758	--	986	--	--	--	231
Quaking aspen	46,395	4,845	640	8,377	4,648	1,403	10,677	869	164	868	--	--	171
Paper birch	23,223	1,571	368	293	695	--	6,612	452	--	205	--	--	765
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	38,345	--	--	6,848	9,066	509	2,547	2,170	1,462	1,229	1,578	--	575
Black walnut	6,156	--	--	--	2,754	--	--	226	1,849	--	--	81	--
Butternut	2,633	247	--	215	--	--	--	--	235	--	--	--	1,246
Other hardwoods	9,646	--	685	2,377	4,191	110	--	143	--	--	205	--	--
Total	772,197	56,143	14,451	80,441	83,403	17,535	74,240	31,274	29,833	16,570	36,330	6,198	30,077
All species	908,183	56,984	17,223	86,055	87,232	18,651	120,032	38,862	31,528	20,631	41,317	7,282	46,229

(Table 26 continued on next page)

(Table 26 continued)

Species group	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	3,064	--	--	162	286	--	--	--	--
White pine	4,132	--	3,857	--	--	--	1,018	--	250	--	--
White spruce	--	--	--	--	--	--	1,977	--	--	--	--
Black spruce	600	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	154	--	--	--	--	--	--	--	--	--	--
Tamarack	921	--	964	352	--	--	1,030	--	302	--	--
Eastern redcedar	--	--	243	--	--	--	--	--	--	--	--
Northern white-cedar	7,298	--	5,494	1,219	--	--	5,428	--	1,704	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	13,105	--	13,622	1,571	--	162	9,739	--	2,256	--	--
Hardwoods											
White oak	762	--	2,226	1,253	1,797	7,520	1,465	13,635	1,492	6,634	775
Select red oak	3,692	--	1,045	--	492	907	6,699	5,257	1,604	8,014	3,136
Other red oak	--	--	--	--	640	4,459	394	842	--	245	--
Select hickory	--	--	--	--	1,233	3,605	1,443	6,956	605	943	3,224
Other hickory	--	--	146	--	--	--	--	--	--	--	--
Basswood	309	--	1,146	390	--	--	839	--	2,558	--	3,635
Beech	1,133	--	2,247	2,498	--	--	211	--	--	--	--
Yellow birch	--	--	483	--	--	--	545	--	915	--	--
Hard maple	8,617	--	2,324	1,639	854	--	7,147	--	4,028	--	760
Soft maple	9,609	--	7,350	--	--	174	1,136	--	6,713	796	624
Elm	2,364	--	6,445	965	--	1,111	2,233	223	2,312	380	1,984
Black ash	796	--	11,011	1,219	--	--	1,274	--	6,850	2,556	1,648
White & green ash	7,598	--	4,504	4,560	534	764	6,399	--	2,452	--	6,365
Cottonwood	950	--	--	--	--	746	--	--	--	--	--
Willow	536	--	5,360	--	--	1,327	92	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	584	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	1,274	--	1,621	--	--	--	591	--	--	--	2,027
Quaking aspen	3,032	--	3,324	--	513	--	1,068	1,587	1,019	1,520	1,670
Paper birch	2,733	--	3,877	4,331	--	--	1,321	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	1,257	--	602	--	204	2,298	703	4,157	1,319	1,821	--
Black walnut	--	--	--	--	--	832	--	414	--	--	--
Butternut	--	--	--	--	--	--	447	--	243	--	--
Other hardwoods	--	--	--	--	694	--	--	--	758	483	--
Total	45,246	--	53,711	16,855	6,961	23,743	34,007	33,071	32,868	23,392	25,848
All species	58,351	--	67,333	18,426	6,961	23,905	43,746	33,071	35,124	23,392	25,848

Table 27.--Net volume of sawtimber on commercial forest land by species group and county, Southeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All counties	County												
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Softwoods													
Jack pine	3,561	--	--	--	3,561	--	--	--	--	--	--	--	--
Red pine	41,833	--	--	--	--	--	--	22,048	--	--	1,400	--	--
White pine	57,630	--	--	2,872	--	--	5,464	--	8,339	--	--	1,918	2,174
White spruce	11,350	--	--	--	--	--	7,522	--	1,249	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	2,000	--	--	--	--	--	2,000	--	--	--	--	--	--
Hemlock	5,006	874	--	--	--	--	1,153	--	--	--	--	--	2,434
Tamarack	23,041	--	--	1,353	5,007	--	--	3,781	--	--	--	--	7,070
Eastern redcedar	1,734	--	--	--	1,734	--	--	--	--	--	--	--	--
Northern white-cedar	179,244	--	11,998	--	--	--	84,090	--	--	--	--	--	36,600
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	325,399	874	11,998	4,225	10,302	--	100,229	25,829	9,588	--	1,400	1,918	48,278
Hardwoods													
White oak	489,711	6,441	--	82,806	119,540	10,316	--	15,611	23,783	9,233	36,309	9,516	--
Select red oak	337,065	19,319	2,212	47,765	35,877	5,911	1,704	11,689	21,808	16,739	29,746	5,042	1,575
Other red oak	181,417	--	--	72,432	62,770	--	--	10,988	1,946	6,107	1,160	377	--
Select hickory	96,411	--	2,106	2,450	8,027	--	--	6,401	2,775	8,372	15,654	3,373	--
Other hickory	12,407	--	--	--	2,356	9,587	--	--	--	--	--	464	--
Basswood	96,363	15,760	10,479	16,739	--	2,693	4,881	3,481	1,334	--	12,049	--	7,206
Beech	53,080	4,389	1,185	--	--	--	4,363	10,233	--	--	--	--	1,058
Yellow birch	9,302	1,248	726	--	--	--	1,023	--	--	--	--	--	3,234
Hard maple	242,902	25,655	4,250	--	--	1,824	54,366	10,218	10,717	--	28,112	--	20,067
Soft maple	180,078	38,561	3,334	1,452	6,545	6,990	11,645	2,427	--	--	--	--	25,616
Elm	109,250	12,940	3,495	696	3,291	3,094	10,917	11,083	20,906	--	3,053	473	2,640
Black ash	49,617	--	--	--	--	1,691	1,776	2,343	4,084	--	--	--	2,694
White & green ash	215,431	26,314	9,154	3,375	--	12,403	34,207	6,667	--	--	13,117	3,256	10,276
Cottonwood	15,931	--	--	1,239	1,001	--	--	3,306	6,738	--	--	--	--
Willow	46,317	1,591	--	--	--	--	942	7,092	--	--	--	--	8,783
Hackberry	3,841	--	--	2,009	--	--	--	--	--	--	1,832	--	--
Balsam poplar	11,434	--	--	--	--	--	9,654	--	--	--	--	--	--
Bigtooth aspen	61,791	7,028	--	9,415	10,590	3,178	15,047	--	--	--	--	--	1,225
Quaking aspen	60,688	1,579	--	2,716	12,336	1,684	10,182	1,066	--	--	--	--	--
Paper birch	26,361	--	1,877	--	--	--	6,720	791	--	--	--	--	3,030
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	110,756	--	--	11,902	33,615	1,272	12,806	9,048	6,716	4,800	3,956	--	--
Black walnut	23,844	--	--	--	11,314	--	--	1,172	7,056	--	--	430	--
Butternut	6,018	1,260	--	--	--	--	--	--	1,189	--	--	--	2,224
Other hardwoods	9,032	--	801	--	5,224	--	--	--	--	--	--	--	--
Total	2,449,047	162,085	39,619	254,996	312,486	60,643	180,233	113,616	109,052	45,251	144,988	22,931	89,628
All species	2,774,446	162,959	51,617	259,221	322,788	60,643	280,462	139,445	118,640	45,251	146,388	24,849	137,906

(Table 27 continued on next page)

[1/] International 1/4-inch rule.

(Table 27 continued)

Species group	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	17,447	--	--	938	--	--	--	--	--
White pine	20,400	--	15,987	--	--	--	476	--	--	--	--
White spruce	--	--	--	--	--	--	2,579	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	545	--	--	--	--	--	--	--	--	--	--
Tamarack	1,110	--	1,712	--	--	--	1,395	--	1,613	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	13,563	--	11,483	4,281	--	--	12,047	--	5,182	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	35,618	--	46,629	4,281	--	938	16,497	--	6,795	--	--
Hardwoods											
White oak	3,924	--	10,029	6,157	9,270	31,390	5,863	68,995	6,724	30,013	3,791
Select red oak	15,877	--	3,992	--	2,501	4,695	28,191	24,630	8,235	34,612	14,945
Other red oak	--	--	--	--	3,149	16,223	997	4,029	--	1,239	--
Select hickory	--	--	--	--	2,101	8,439	1,068	22,434	3,181	3,775	6,255
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	1,492	--	2,293	1,941	--	--	3,206	--	9,711	--	3,098
Beech	5,971	--	12,071	12,667	--	--	1,143	--	--	--	--
Yellow birch	--	--	--	--	--	--	1,890	--	1,181	--	--
Hard maple	35,514	--	3,846	--	2,267	--	23,623	--	19,838	--	2,605
Soft maple	37,810	--	19,576	--	--	--	5,886	--	17,880	2,356	--
Elm	8,406	--	15,347	1,788	--	1,166	5,193	--	3,530	1,232	--
Black ash	2,657	--	15,514	3,408	--	--	3,253	--	1,638	10,559	--
White & green ash	19,825	--	10,201	18,422	1,168	1,508	8,760	--	10,451	--	26,327
Cottonwood	2,859	--	--	--	--	788	--	--	--	--	--
Willow	2,253	--	21,278	--	--	4,378	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	1,780	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	2,427	--	7,417	--	--	--	1,049	--	--	--	4,415
Quaking aspen	7,747	--	8,015	--	--	--	2,085	1,686	4,164	1,960	5,468
Paper birch	1,140	--	7,716	4,099	--	--	988	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	1,502	--	1,766	--	--	7,263	--	8,253	1,411	6,446	--
Black walnut	--	--	--	--	--	1,683	--	2,189	--	--	--
Butternut	--	--	--	--	--	--	--	--	1,345	--	--
Other hardwoods	--	--	--	--	--	--	--	--	1,156	1,851	--
Total	151,184	--	139,061	48,482	20,456	77,533	93,195	132,216	90,445	94,043	66,904
All species	186,802	--	185,690	52,763	20,456	78,471	109,692	132,216	97,240	94,043	66,904

Table 28.--Net volume of growing stock on commercial forest land by species group and diameter class, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	2,629	1,647	292	453	237	--	--	--	--	--	--	--	--
Red pine	19,687	7,050	5,320	5,466	1,227	624	--	--	--	--	--	--	--
White pine	16,386	2,380	2,770	1,060	2,046	2,705	1,945	1,019	1,290	445	726	--	--
White spruce	4,425	1,129	915	1,091	562	503	--	--	--	--	225	--	--
Black spruce	827	448	379	--	--	--	--	--	--	--	--	--	--
Balsam fir	1,989	891	645	181	272	--	--	--	--	--	--	--	--
Hemlock	2,506	647	606	558	409	131	--	155	--	--	--	--	--
Tamarack	10,043	1,333	4,407	602	2,371	169	171	810	180	--	--	--	--
Eastern redcedar	2,089	1,451	344	--	--	--	294	--	--	--	--	--	--
Northern white-cedar	75,064	18,228	21,119	16,751	9,434	6,603	2,143	786	--	--	--	--	--
Other softwoods	341	101	240	--	--	--	--	--	--	--	--	--	--
Total	135,986	35,305	37,037	26,162	16,558	10,735	4,553	2,770	1,470	445	951	--	--
Hardwoods													
White oak	109,832	2,240	3,639	6,497	9,530	14,424	12,578	15,012	12,720	11,393	13,629	6,132	2,038
Select red oak	76,541	596	3,989	4,173	5,518	8,336	8,638	11,414	8,006	8,707	12,662	4,099	403
Other red oak	49,150	2,725	3,735	4,672	5,133	7,465	7,414	5,376	4,592	4,597	2,693	748	--
Select hickory	34,079	3,037	5,656	7,033	7,920	3,669	2,861	2,650	879	--	374	--	--
Other hickory	8,197	3,630	1,315	839	1,192	318	903	--	--	--	--	--	--
Basswood	27,278	1,455	2,293	4,018	2,796	4,603	1,803	2,663	1,792	1,536	2,438	1,881	--
Beech	12,848	617	738	1,406	2,782	1,665	460	2,829	484	1,435	432	--	--
Yellow birch	6,990	1,574	1,014	2,322	948	426	510	196	--	--	--	--	--
Hard maple	68,998	7,685	6,576	7,086	12,204	5,519	6,575	4,081	5,484	4,179	6,990	2,619	--
Soft maple	54,651	7,203	4,020	6,628	6,623	6,655	7,196	5,335	2,888	3,344	2,219	2,278	262
Elm	43,684	3,508	7,411	8,131	6,486	5,317	4,542	1,900	2,751	195	2,074	1,097	272
Black ash	41,553	13,686	13,035	6,599	4,651	1,448	1,859	275	--	--	--	--	--
White & green ash	72,123	5,622	11,613	14,274	13,340	8,769	6,323	3,545	2,750	637	3,790	1,460	--
Cottonwood	4,426	--	233	701	388	226	--	220	231	--	246	1,067	1,114
Willow	12,161	394	484	260	1,485	815	2,537	2,882	1,367	686	1,251	--	--
Hackberry	843	--	--	--	215	240	--	--	--	--	388	--	--
Balsam poplar	3,286	--	--	807	--	838	849	--	392	400	--	--	--
Bigtooth aspen	19,159	1,172	1,149	3,323	7,784	3,794	1,397	309	--	--	--	231	--
Quaking aspen	46,395	14,594	10,097	9,606	5,738	3,009	2,159	841	351	--	--	--	--
Paper birch	23,223	3,846	8,206	6,040	2,674	1,391	1,066	--	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	38,345	7,165	5,060	5,660	6,290	6,056	3,137	2,335	1,485	336	821	--	--
Black walnut	6,156	1,315	325	159	442	1,256	546	1,944	169	--	--	--	--
Butternut	2,633	--	623	925	179	181	247	--	243	235	--	--	--
Other hardwoods	9,646	4,472	1,739	1,800	570	637	221	207	--	--	--	--	--
Total	772,197	86,536	92,950	102,959	104,888	87,057	73,821	64,014	46,584	37,680	50,007	21,612	4,089
All species	908,183	121,841	129,987	129,121	121,446	97,792	78,374	66,784	48,054	38,125	50,958	21,612	4,089

Table 29.--Net volume of sawtimber on commercial forest land by species group and diameter class, Southeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	3,561	2,338	1,223	--	--	--	--	--	--	--	--
Red pine	41,833	31,345	6,945	3,543	--	--	--	--	--	--	--
White pine	57,630	4,150	9,564	13,696	10,361	5,642	7,331	2,596	4,290	--	--
White spruce	11,350	4,888	2,686	2,527	--	--	--	--	1,249	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	2,000	711	1,289	--	--	--	--	--	--	--	--
Hemlock	5,006	2,030	1,681	574	--	721	--	--	--	--	--
Tamarack	23,041	3,107	12,533	925	950	4,507	1,019	--	--	--	--
Eastern redcedar	1,734	--	--	--	1,734	--	--	--	--	--	--
Northern white-cedar	179,244	81,138	47,727	34,598	11,506	4,275	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	325,399	129,707	83,648	55,863	24,551	15,145	8,350	2,596	5,539	--	--
Hardwoods											
White oak	489,711	--	52,871	75,488	63,425	74,086	62,204	55,268	66,261	30,063	10,045
Select red oak	337,065	--	26,536	40,582	41,901	56,224	39,919	43,771	64,694	21,310	2,128
Other red oak	181,417	--	24,060	35,164	34,906	25,599	22,181	22,397	13,314	3,796	--
Select hickory	96,411	--	44,200	19,104	14,409	12,645	4,258	--	1,795	--	--
Other hickory	12,407	--	6,403	1,592	4,412	--	--	--	--	--	--
Basswood	96,363	--	13,559	22,119	8,736	13,097	8,903	7,669	12,489	9,791	--
Beech	53,080	--	15,018	9,064	2,446	14,580	2,481	7,257	2,234	--	--
Yellow birch	9,302	--	3,911	1,898	2,478	1,015	--	--	--	--	--
Hard maple	242,902	--	58,723	27,157	32,964	20,906	28,691	22,023	37,874	14,564	--
Soft maple	180,078	--	35,815	33,612	34,877	24,880	13,402	15,561	10,222	10,487	1,222
Elm	109,250	--	27,856	22,894	19,977	8,452	12,585	922	9,868	5,328	1,368
Black ash	49,617	--	29,603	8,465	10,130	1,419	--	--	--	--	--
White & green ash	215,431	--	78,311	47,118	32,168	17,368	13,259	2,971	17,508	6,728	--
Cottonwood	15,931	--	1,583	920	--	939	1,001	--	1,125	5,011	5,352
Willow	46,317	--	5,973	3,250	10,448	12,131	5,912	2,978	5,625	--	--
Hackberry	3,841	--	943	1,066	--	--	--	--	1,832	--	--
Balsam poplar	11,434	--	--	3,649	3,973	--	1,855	1,957	--	--	--
Bigtooth aspen	61,791	--	34,773	17,611	6,696	1,486	--	--	--	1,225	--
Quaking aspen	60,688	--	27,567	15,210	11,414	4,564	1,933	--	--	--	--
Paper birch	26,361	--	13,418	7,223	5,720	--	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	110,756	--	36,927	32,565	16,247	11,894	7,415	1,622	4,086	--	--
Black walnut	23,844	--	2,762	7,188	2,801	10,182	911	--	--	--	--
Butternut	6,018	--	1,139	1,085	1,260	--	1,345	1,189	--	--	--
Other hardwoods	9,032	--	3,148	3,493	1,235	1,156	--	--	--	--	--
Total	2,449,047	--	545,099	437,517	362,623	312,623	228,255	185,585	248,927	108,303	20,115
All species	2,774,446	129,707	628,747	493,380	387,174	327,768	236,605	188,181	254,466	108,303	20,115

[1/] International 1/4-inch rule.

Table 30.--Net volume of growing stock on commercial forest land by species group and forest type, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All types	Forest type							
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack
Softwoods									
Jack pine	2,629	1,672	--	--	--	--	--	--	--
Red pine	19,687	--	15,664	3,575	--	286	--	--	--
White pine	16,386	250	--	9,142	--	--	--	1,191	50
White spruce	4,425	--	--	225	--	1,977	--	753	--
Black spruce	827	--	--	--	--	--	600	227	--
Balsam fir	1,989	--	--	--	--	--	--	1,400	--
Hemlock	2,506	--	--	--	--	--	--	402	--
Tamarack	10,043	--	--	--	--	--	--	3,582	4,015
Eastern redcedar	2,089	--	--	--	--	--	--	--	--
Northern white-cedar	75,064	--	--	--	--	--	--	47,728	--
Other softwoods	341	--	--	341	--	--	--	--	--
Total	135,986	1,922	15,664	13,283	--	2,263	600	55,283	4,065
Hardwoods									
White oak	109,832	--	--	--	--	--	--	184	--
Select red oak	76,541	--	--	--	--	--	--	--	--
Other red oak	49,150	--	412	--	--	--	--	--	--
Select hickory	34,079	--	--	--	--	--	--	197	--
Other hickory	8,197	--	--	--	--	--	--	146	--
Basswood	27,278	--	--	--	--	--	--	919	--
Beech	12,848	--	--	--	--	--	--	--	--
Yellow birch	6,990	--	--	--	--	--	--	1,389	--
Hard maple	68,998	--	--	--	--	--	--	248	--
Soft maple	54,651	328	--	--	--	--	--	1,001	--
Elm	43,684	--	--	388	--	--	--	766	511
Black ash	41,553	--	--	--	--	--	--	1,452	483
White & green ash	72,123	--	--	--	--	301	--	173	--
Cottonwood	4,426	--	--	--	--	--	--	--	--
Willow	12,161	--	--	--	--	--	--	438	--
Hackberry	843	--	--	--	--	--	--	--	--
Balsam poplar	3,286	--	--	--	--	--	--	--	--
Bigtooth aspen	19,159	--	--	256	--	--	--	--	--
Quaking aspen	46,395	--	--	--	--	--	351	4,213	--
Paper birch	23,223	--	--	--	--	--	--	4,043	205
River birch	--	--	--	--	--	--	--	--	--
Black cherry	38,345	--	--	294	--	--	--	--	--
Black walnut	6,156	--	--	--	--	--	--	--	--
Butternut	2,633	--	--	--	--	--	--	--	--
Other hardwoods	9,646	--	--	--	--	--	--	--	--
Total	772,197	328	412	938	--	301	351	15,169	1,199
All species	908,183	2,250	16,076	14,221	--	2,564	951	70,452	5,264

(Table 30 continued on next page)

(Table 30 continued)

Species group	Forest type						
	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods							
Jack pine	957	--	--	--	--	--	--
Red pine	162	--	--	--	--	--	--
White pine	1,092	215	4,332	--	--	--	114
White spruce	445	1,025	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--
Balsam fir	--	--	--	589	--	--	--
Hemlock	--	1,392	419	293	--	--	--
Tamarack	--	1,638	--	456	352	--	--
Eastern redcedar	812	1,277	--	--	--	--	--
Northern white-cedar	--	15,553	8,689	1,875	1,219	--	--
Other softwoods	--	--	--	--	--	--	--
Total	3,468	21,100	13,440	3,213	1,571	--	114
Hardwoods							
White oak	93,636	2,887	11,765	1,360	--	--	--
Select red oak	60,865	1,605	14,071	--	--	--	--
Other red oak	43,709	337	1,665	3,027	--	--	--
Select hickory	26,084	--	7,465	333	--	--	--
Other hickory	5,803	--	2,248	--	--	--	--
Basswood	2,454	2,082	21,823	--	--	--	--
Beech	--	--	12,848	--	--	--	--
Yellow birch	--	3,360	2,241	--	--	--	--
Hard maple	4,276	672	63,191	611	--	--	--
Soft maple	2,013	37,039	13,542	728	--	--	--
Elm	3,942	14,052	22,212	756	791	--	266
Black ash	1,071	31,844	5,752	951	--	--	--
White & green ash	5,009	30,320	35,185	707	428	--	--
Cottonwood	810	3,293	--	323	--	--	--
Willow	--	9,151	2,480	92	--	--	--
Hackberry	843	--	--	--	--	--	--
Balsam poplar	--	1,027	1,182	1,077	--	--	--
Bigtooth aspen	7,763	1,161	8,339	1,640	--	--	--
Quaking aspen	5,526	6,556	5,238	24,348	163	--	--
Paper birch	1,287	6,370	5,309	2,571	3,438	--	--
River birch	--	--	--	--	--	--	--
Black cherry	19,798	--	14,791	3,462	--	--	--
Black walnut	5,652	--	504	--	--	--	--
Butternut	450	243	1,940	--	--	--	--
Other hardwoods	886	2,515	6,245	--	--	--	--
Total	291,877	154,514	260,036	41,986	4,820	--	266
All species	295,345	175,614	273,476	45,199	6,391	--	380

Table 31.--Net volume of sawtimber on commercial forest land by species group and forest type, Southeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All types	Forest type							
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack
Softwoods									
Jack pine	3,561	--	--	--	--	--	--	--	--
Red pine	41,833	--	23,448	17,447	--	--	--	--	--
White pine	57,630	--	--	25,033	--	--	--	4,895	--
White spruce	11,350	--	--	1,249	--	2,579	--	2,863	--
Black spruce	--	--	--	--	--	--	--	--	--
Balsam fir	2,000	--	--	--	--	--	--	1,289	--
Hemlock	5,006	--	--	--	--	--	--	1,627	--
Tamarack	23,041	--	--	--	--	--	--	9,575	4,627
Eastern redcedar	1,734	--	--	--	--	--	--	--	--
Northern white-cedar	179,244	--	--	--	--	--	--	95,003	--
Other softwoods	--	--	--	--	--	--	--	--	--
Total	325,399	--	23,448	43,729	--	2,579	--	115,252	4,627
Hardwoods									
White oak	489,711	--	--	--	--	--	--	1,004	--
Select red oak	337,065	--	--	--	--	--	--	--	--
Other red oak	181,417	--	1,898	--	--	--	--	--	--
Select hickory	96,411	--	--	--	--	--	--	1,146	--
Other hickory	12,407	--	--	--	--	--	--	--	--
Basswood	96,363	--	--	--	--	--	--	3,717	--
Beech	53,080	--	--	--	--	--	--	--	--
Yellow birch	9,302	--	--	--	--	--	--	--	--
Hard maple	242,902	--	--	--	--	--	--	1,330	--
Soft maple	180,078	--	--	--	--	--	--	4,274	--
Elm	109,250	--	--	1,088	--	--	--	1,677	1,838
Black ash	49,617	--	--	--	--	--	--	--	--
White & green ash	215,431	--	--	--	--	--	--	878	--
Cottonwood	15,931	--	--	--	--	--	--	--	--
Willow	46,317	--	--	--	--	--	--	1,896	--
Hackberry	3,841	--	--	--	--	--	--	--	--
Balsam poplar	11,434	--	--	--	--	--	--	--	--
Bigtooth aspen	61,791	--	--	--	--	--	--	--	--
Quaking aspen	60,688	--	--	--	--	--	--	7,791	--
Paper birch	26,361	--	--	--	--	--	--	4,108	--
River birch	--	--	--	--	--	--	--	--	--
Black cherry	110,756	--	--	--	--	--	--	--	--
Black walnut	23,844	--	--	--	--	--	--	--	--
Butternut	6,018	--	--	--	--	--	--	--	--
Other hardwoods	9,032	--	--	--	--	--	--	--	--
Total	2,449,047	--	1,898	1,088	--	--	--	27,821	1,838
All species	2,774,446	--	25,346	44,817	--	2,579	--	143,073	6,465

(Table 31 continued on next page)

[1/] International 1/4-inch rule.

(Table 31 continued)

Species group	Forest type						
	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods							
Jack pine	3,561	--	--	--	--	--	--
Red pine	938	--	--	--	--	--	--
White pine	6,150	1,054	19,929	--	--	--	569
White spruce	--	4,659	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--
Balsam fir	--	--	--	711	--	--	--
Hemlock	--	1,381	1,453	545	--	--	--
Tamarack	--	8,839	--	--	--	--	--
Eastern redcedar	1,734	--	--	--	--	--	--
Northern white-ced	--	44,943	30,426	4,591	4,281	--	--
Other softwoods	--	--	--	--	--	--	--
Total	12,383	60,876	51,808	5,847	4,281	--	569
Hardwoods							
White oak	412,350	14,500	56,148	5,709	--	--	--
Select red oak	274,178	6,453	56,434	--	--	--	--
Other red oak	162,425	--	5,463	11,631	--	--	--
Select hickory	70,314	--	24,951	--	--	--	--
Other hickory	12,407	--	--	--	--	--	--
Basswood	6,675	6,312	79,659	--	--	--	--
Beech	--	--	53,080	--	--	--	--
Yellow birch	--	6,572	2,730	--	--	--	--
Hard maple	10,567	2,513	225,527	2,965	--	--	--
Soft maple	8,357	118,707	46,581	2,159	--	--	--
Elm	11,665	37,088	51,388	1,416	1,788	--	1,302
Black ash	--	46,700	2,917	--	--	--	--
White & green ash	19,608	88,327	100,933	3,074	2,611	--	--
Cottonwood	1,239	13,691	--	1,001	--	--	--
Willow	--	34,128	10,293	--	--	--	--
Hackberry	3,841	--	--	--	--	--	--
Balsam poplar	--	1,917	5,592	3,925	--	--	--
Bigtooth aspen	23,865	5,379	26,936	5,611	--	--	--
Quaking aspen	3,703	10,400	9,954	28,840	--	--	--
Paper birch	988	12,006	5,160	--	4,099	--	--
River birch	--	--	--	--	--	--	--
Black cherry	59,214	--	42,918	8,624	--	--	--
Black walnut	20,989	--	2,855	--	--	--	--
Butternut	1,189	1,345	3,484	--	--	--	--
Other hardwoods	1,753	3,884	3,395	--	--	--	--
Total	1,105,327	409,922	816,398	74,955	8,498	--	1,302
All species	1,117,710	470,798	868,206	80,802	12,779	--	1,871

Table 32.--Net volume of growing stock on commercial forest land by species group and ownership class, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	2,629	--	--	--	--	--	--	2,362	--	267
Red pine	19,687	--	--	7,065	--	--	--	3,575	1,999	7,048
White pine	16,386	--	--	1,156	--	--	--	11,513	347	3,370
White spruce	4,425	--	--	598	--	--	445	1,250	--	2,132
Black spruce	827	--	--	--	--	--	--	600	--	227
Balsam fir	1,989	--	--	504	--	--	--	--	181	1,304
Hemlock	2,506	--	--	--	--	--	--	1,910	386	210
Tamarack	10,043	--	--	685	750	--	488	3,957	2,098	2,065
Eastern redcedar	2,089	--	--	--	--	--	--	1,328	--	761
Northern white-cedar	75,064	--	--	2,336	--	--	3,333	32,198	4,354	32,843
Other softwoods	341	--	--	341	--	--	--	--	--	--
Total	135,986	--	--	12,685	750	--	4,266	58,693	9,365	50,227
Hardwoods										
White oak	109,832	--	--	6,939	239	--	--	55,391	6,887	40,376
Select red oak	76,541	--	--	4,436	1,689	--	--	44,589	1,160	24,667
Other red oak	49,150	--	--	1,855	--	--	--	23,294	1,173	22,828
Select hickory	34,079	--	--	962	--	--	332	17,250	4,323	11,212
Other hickory	8,197	--	--	--	--	--	--	7,228	--	969
Basswood	27,278	--	--	--	--	--	--	16,391	791	10,096
Beech	12,848	--	--	--	--	--	--	8,177	1,975	2,696
Yellow birch	6,990	--	--	--	--	--	414	3,451	1,389	1,736
Hard maple	68,998	--	--	874	321	--	--	39,484	2,699	25,620
Soft maple	54,651	--	--	11,432	8,187	--	3,266	20,520	1,604	9,642
Elm	43,684	--	--	1,207	1,573	--	1,417	23,894	1,428	14,165
Black ash	41,553	--	--	5,122	710	--	1,542	16,163	2,911	15,105
White & green ash	72,123	--	--	1,652	1,144	--	2,745	43,665	3,422	19,495
Cottonwood	4,426	--	730	297	1,408	--	269	--	772	950
Willow	12,161	--	1,677	1,419	374	--	616	4,282	2,915	878
Hackberry	843	--	--	--	--	--	--	--	--	843
Balsam poplar	3,286	--	--	390	--	--	--	2,013	256	627
Bigtooth aspen	19,159	--	--	335	930	--	--	10,991	--	6,903
Quaking aspen	46,395	--	1,595	9,014	762	--	486	16,034	4,667	13,837
Paper birch	23,223	--	436	1,115	891	--	1,797	6,694	1,092	11,198
River birch	--	--	--	--	--	--	--	--	--	--
Black cherry	38,345	--	--	1,720	--	--	392	16,258	4,169	15,806
Black walnut	6,156	--	--	--	--	--	--	3,716	--	2,440
Butternut	2,633	--	--	--	--	--	--	1,489	447	697
Other hardwoods	9,646	--	143	483	--	--	--	4,804	--	4,216
Total	772,197	--	4,581	49,252	18,228	--	13,276	385,778	44,080	257,002
All species	908,183	--	4,581	61,937	18,978	--	17,542	444,471	53,445	307,229

Table 33.--Net volume of sawtimber on commercial forest land by species group and ownership class, Southeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	3,561	--	--	--	--	--	--	3,561	--	--
Red pine	41,833	--	--	22,986	--	--	--	17,447	--	1,400
White pine	57,630	--	--	4,085	--	--	--	46,494	1,687	5,364
White spruce	11,350	--	--	2,863	--	--	--	5,908	--	2,579
Black spruce	--	--	--	--	--	--	--	--	--	--
Balsam fir	2,000	--	--	--	--	--	--	--	711	1,289
Hemlock	5,006	--	--	--	--	--	--	3,379	906	721
Tamarack	23,041	--	--	3,781	--	--	--	8,015	7,916	3,329
Eastern redcedar	1,734	--	--	--	--	--	--	1,734	--	--
Northern white-cedar	179,244	--	--	10,847	--	--	3,876	61,344	8,138	95,039
Other softwoods	--	--	--	--	--	--	--	--	--	--
Total	325,399	--	--	44,562	--	--	3,876	147,882	19,358	109,721
Hardwoods										
White oak	489,711	--	--	34,890	1,179	--	--	244,834	30,427	178,381
Select red oak	337,065	--	--	19,127	6,808	--	--	205,435	5,922	99,773
Other red oak	181,417	--	--	3,853	--	--	--	87,886	5,672	84,006
Select hickory	96,411	--	--	2,279	--	--	--	50,197	10,955	32,980
Other hickory	12,407	--	--	--	--	--	--	11,943	--	464
Basswood	96,363	--	--	--	--	--	--	53,411	3,908	39,044
Beech	53,080	--	--	--	--	--	--	35,667	10,747	6,666
Yellow birch	9,302	--	--	--	--	--	1,023	4,907	--	3,372
Hard maple	242,902	--	--	1,079	--	--	--	135,082	13,673	93,068
Soft maple	180,078	--	--	43,713	21,469	--	9,595	77,446	3,824	24,031
Elm	109,250	--	--	1,232	6,661	--	3,465	61,243	5,045	31,604
Black ash	49,617	--	--	10,559	1,838	--	3,626	11,811	3,408	18,375
White & green ash	215,431	--	--	5,416	3,985	--	13,968	117,085	10,363	64,614
Cottonwood	15,931	--	3,306	788	6,738	--	1,239	--	1,001	2,859
Willow	46,317	--	7,092	4,378	1,591	--	2,570	18,152	8,641	3,893
Hackberry	3,841	--	--	--	--	--	--	--	--	3,841
Balsam poplar	11,434	--	--	1,780	--	--	--	5,729	1,212	2,713
Bigtooth aspen	61,791	--	--	1,049	4,154	--	--	34,293	--	22,295
Quaking aspen	60,688	--	1,579	4,590	--	--	1,519	23,922	9,358	19,720
Paper birch	26,361	--	--	988	--	--	6,892	8,081	1,140	9,260
River birch	--	--	--	--	--	--	--	--	--	--
Black cherry	110,756	--	--	2,159	--	--	1,049	49,382	15,398	42,768
Black walnut	23,844	--	--	--	--	--	--	10,341	--	13,503
Butternut	6,018	--	--	--	--	--	--	3,569	--	2,449
Other hardwoods	9,032	--	--	1,851	--	--	--	4,666	--	2,515
Total	2,449,047	--	11,977	139,731	54,423	--	44,946	1,255,082	140,694	802,194
All species	2,774,446	--	11,977	184,293	54,423	--	48,822	1,402,964	160,052	911,915

[1/] International 1/4-inch rule.

Table 34.--Net volume of growing stock on commercial forest land by forest type and stand-age class, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	2,250	--	--	--	2,250	--	--	--	--	--	--	--	--	--
Red pine	16,076	--	9,173	--	6,903	--	--	--	--	--	--	--	--	--
White pine	14,221	--	1,528	2,358	--	8,640	--	--	--	1,695	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	2,564	--	--	--	2,564	--	--	--	--	--	--	--	--	--
Black spruce	951	--	951	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	70,452	946	5,122	--	3,610	10,547	6,461	3,859	3,753	3,729	15,256	10,721	6,448	--
Tamarack	5,264	--	365	--	2,563	1,168	--	1,168	--	--	--	--	--	--
Oak-hickory	295,345	1,678	2,293	4,761	7,367	14,126	25,905	13,593	34,811	30,530	45,846	35,289	38,981	40,165
Elm-ash-soft maple	175,614	6,047	8,774	23,437	23,468	20,872	16,413	20,395	27,655	11,576	6,661	5,623	4,693	--
Maple-birch	273,476	7,387	14,174	16,216	22,054	10,950	40,849	48,313	31,305	20,586	29,063	15,933	12,623	4,023
Aspen	45,199	2,539	6,185	7,447	13,039	5,078	4,551	2,215	4,145	--	--	--	--	--
Paper birch	6,391	163	--	--	6,228	--	--	--	--	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	380	380	--	--	--	--	--	--	--	--	--	--	--	--
All types	908,183	19,140	48,565	54,219	90,046	71,381	94,179	89,543	101,669	68,116	96,826	67,566	62,745	44,188

Table 35.--Net volume of sawtimber on commercial forest land by forest type and stand-age class, Southeastern Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Red pine	25,346	--	3,298	--	22,048	--	--	--	--	--	--	--	--	--
White pine	44,817	--	--	2,394	--	32,835	--	--	--	9,588	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	2,579	--	--	--	2,579	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	143,073	2,150	--	--	4,183	17,328	15,614	993	2,680	8,304	33,383	37,686	20,752	--
Tamarack	6,465	--	846	--	--	1,838	--	3,781	--	--	--	--	--	--
Oak-hickory	1,117,710	4,492	5,710	5,104	8,465	36,017	83,231	52,281	129,377	102,220	185,377	148,728	174,010	182,698
Elm-ash-soft maple	470,798	16,573	18,744	37,709	34,457	57,578	44,506	54,117	79,527	52,346	32,950	22,343	19,948	--
Maple-birch	868,206	12,044	47,270	34,099	31,907	27,901	107,377	168,681	121,609	79,455	104,152	64,640	53,017	16,054
Aspen	80,802	3,773	10,155	10,233	9,430	13,829	19,330	5,111	8,941	--	--	--	--	--
Paper birch	12,779	--	--	--	12,779	--	--	--	--	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	1,871	1,871	--	--	--	--	--	--	--	--	--	--	--	--
All types	2,774,446	40,903	86,023	89,539	125,848	187,326	270,058	284,964	342,134	251,913	355,862	273,397	267,727	198,752

[1/] International 1/4-inch rule.

Table 36.--Net volume of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	2,250	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	2,250	--	--	--	--	--	--	--
Red pine								
Sawtimber	6,903	--	--	--	--	--	--	--
Poletimber	6,986	--	--	--	--	--	--	1,999
Sapling & seedling	2,187	--	--	--	--	--	--	--
All stands	16,076	--	--	--	--	--	--	1,999
White pine								
Sawtimber	8,539	--	--	--	1,695	--	--	--
Poletimber	5,682	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	14,221	--	--	--	1,695	--	--	--
Balsam fir								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
White spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	2,564	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	2,564	--	--	--	--	--	--	--
Black spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	951	--	--	--	--	--	--	951
All stands	951	--	--	--	--	--	--	951
Northern white-cedar								
Sawtimber	36,779	--	--	--	--	2,702	--	--
Poletimber	25,962	--	--	--	--	--	--	--
Sapling & seedling	7,711	--	--	946	--	--	--	--
All stands	70,452	--	--	946	--	2,702	--	--

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	2,250	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	2,250	--	--	--	--	--
Red pine							
Sawtimber	--	--	--	--	--	6,903	--
Poletimber	--	4,987	--	--	--	--	--
Sapling & seedling	--	--	--	--	2,187	--	--
All stands	--	4,987	--	--	2,187	6,903	--
White pine							
Sawtimber	--	--	--	--	6,844	--	--
Poletimber	1,084	--	1,796	2,802	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	1,084	--	1,796	2,802	6,844	--	--
Balsam fir							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
White spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	2,564	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	2,564	--	--	--	--
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Northern white-cedar							
Sawtimber	1,185	--	--	--	12,508	5,821	14,563
Poletimber	--	1,967	--	2,544	3,859	17,592	--
Sapling & seedling	2,610	1,643	--	2,512	--	--	--
All stands	3,795	3,610	--	5,056	16,367	23,413	14,563

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	1,168	--	--	1,168	--	--	--	--
Poletimber	3,731	--	--	--	--	--	1,168	--
Sapling & seedling	365	--	365	--	--	--	--	--
All stands	5,264	--	365	1,168	--	--	1,168	--
Oak-hickory								
Sawtimber	266,246	--	709	918	819	9,725	6,208	14,448
Poletimber	25,128	--	--	--	--	--	1,610	--
Sapling & seedling	3,971	--	177	660	--	596	905	--
All stands	295,345	--	886	1,578	819	10,321	8,723	14,448
Elm-ash-soft maple								
Sawtimber	87,444	--	--	2,292	3,681	2,798	10,570	2,579
Poletimber	75,408	--	1,317	4,914	1,993	2,557	4,732	4,588
Sapling & seedling	12,762	--	557	--	3,286	2,685	--	3,739
All stands	175,614	--	1,874	7,206	8,960	8,040	15,302	10,906
Maple-birch								
Sawtimber	187,009	--	--	--	1,662	5,582	7,138	5,591
Poletimber	65,704	--	--	846	--	3,137	4,711	--
Sapling & seedling	20,763	--	--	--	823	2,902	273	1,545
All stands	273,476	--	--	846	2,485	11,621	12,122	7,136
Aspen								
Sawtimber	14,706	--	--	--	--	--	2,215	--
Poletimber	21,256	--	--	2,454	--	1,283	1,968	--
Sapling & seedling	9,237	--	235	741	472	1,565	--	1,638
All stands	45,199	--	235	3,195	472	2,848	4,183	1,638
Paper birch								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	6,228	--	--	--	--	--	--	--
Sapling & seedling	163	--	163	--	--	--	--	--
All stands	6,391	--	163	--	--	--	--	--
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Nonstocked	380	114	266	--	--	--	--	--
All types								
Sawtimber	608,794	--	709	4,378	7,857	20,807	26,131	22,618
Poletimber	240,899	--	1,317	8,214	1,993	6,977	14,189	6,587
Sapling & seedling	58,110	--	1,497	2,347	4,581	7,748	1,178	7,873
Nonstocked	380	114	266	--	--	--	--	--
All stands	908,183	114	3,789	14,939	14,431	35,532	41,498	37,078

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	2,563	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	2,563	--	--	--	--	--
Oak-hickory							
Sawtimber	31,292	41,703	27,213	67,832	36,515	28,864	--
Poletimber	4,428	5,861	4,572	4,550	4,107	--	--
Sapling & seedling	--	--	--	1,633	--	--	--
All stands	35,720	47,564	31,785	74,015	40,622	28,864	--
Elm-ash-soft maple							
Sawtimber	8,084	2,575	16,572	19,125	--	10,433	8,735
Poletimber	1,059	7,663	7,552	12,385	4,598	22,050	--
Sapling & seedling	1,056	1,439	--	--	--	--	--
All stands	10,199	11,677	24,124	31,510	4,598	32,483	8,735
Maple-birch							
Sawtimber	23,595	16,692	25,494	31,277	35,845	19,861	14,272
Poletimber	6,683	5,194	10,203	15,298	7,593	12,039	--
Sapling & seedling	4,900	9,096	--	1,224	--	--	--
All stands	35,178	30,982	35,697	47,799	43,438	31,900	14,272
Aspen							
Sawtimber	--	--	3,795	8,696	--	--	--
Poletimber	3,017	2,031	10,503	--	--	--	--
Sapling & seedling	--	2,679	1,907	--	--	--	--
All stands	3,017	4,710	16,205	8,696	--	--	--
Paper birch							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	6,228	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	6,228	--	--	--
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--	--
All types							
Sawtimber	64,156	60,970	73,074	126,930	91,712	71,882	37,570
Poletimber	16,271	32,516	37,190	43,807	20,157	51,681	--
Sapling & seedling	8,566	14,857	1,907	5,369	2,187	--	--
Nonstocked	--	--	--	--	--	--	--
All stands	88,993	108,343	112,171	176,106	114,056	123,563	37,570

Table 37.--Net volume of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Southeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Red pine								
Sawtimber	22,048	--	--	--	--	--	--	--
Poletimber	1,400	--	--	--	--	--	--	--
Sapling & seedling	1,898	--	--	--	--	--	--	--
All stands	25,346	--	--	--	--	--	--	--
White pine								
Sawtimber	42,423	--	--	--	9,588	--	--	--
Poletimber	2,394	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	44,817	--	--	--	9,588	--	--	--
Balsam fir								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
White spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	2,579	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	2,579	--	--	--	--	--	--	--
Black spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Northern white-cedar								
Sawtimber	112,116	--	--	--	--	11,897	--	--
Poletimber	25,578	--	--	--	--	--	--	--
Sapling & seedling	5,379	--	--	2,150	--	--	--	--
All stands	143,073	--	--	2,150	--	11,897	--	--

(Table 37 continued on next page)

[1/] International 1/4-inch rule.

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Red pine							
Sawtimber	--	--	--	--	--	22,048	--
Poletimber	--	1,400	--	--	--	--	--
Sapling & seedling	--	--	--	--	1,898	--	--
All stands	--	1,400	--	--	1,898	22,048	--
White pine							
Sawtimber	--	--	--	--	32,835	--	--
Poletimber	1,918	--	--	476	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	1,918	--	--	476	32,835	--	--
Balsam fir							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
White spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	2,579	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	2,579	--	--	--	--
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Northern white-cedar							
Sawtimber	6,060	--	--	--	43,794	12,074	38,291
Poletimber	--	954	--	2,244	993	21,387	--
Sapling & seedling	--	3,229	--	--	--	--	--
All stands	6,060	4,183	--	2,244	44,787	33,461	38,291

(Table 37 continued on next page)

(Table 37 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	3,781	--	--	3,781	--	--	--	--
Poletimber	1,838	--	--	--	--	--	1,838	--
Sapling & seedling	846	--	846	--	--	--	--	--
All stands	6,465	--	846	3,781	--	--	1,838	--
Oak-hickory								
Sawtimber	1,069,762	--	3,524	4,734	4,128	50,179	31,802	59,303
Poletimber	37,746	--	--	--	--	--	2,288	--
Sapling & seedling	10,202	--	960	3,125	--	--	3,532	--
All stands	1,117,710	--	4,484	7,859	4,128	50,179	37,622	59,303
Elm-ash-soft maple								
Sawtimber	326,653	--	--	8,675	14,089	9,849	45,279	12,429
Poletimber	116,242	--	675	6,500	3,917	5,565	7,693	7,886
Sapling & seedling	27,903	--	1,382	--	5,725	4,489	--	8,364
All stands	470,798	--	2,057	15,175	23,731	19,903	52,972	28,679
Maple-birch								
Sawtimber	691,521	--	--	--	5,995	28,958	19,223	22,826
Poletimber	115,671	--	--	--	--	7,480	6,084	--
Sapling & seedling	61,014	--	--	--	3,896	10,940	--	7,639
All stands	868,206	--	--	--	9,891	47,378	25,307	30,465
Aspen								
Sawtimber	44,726	--	--	--	--	--	5,111	--
Poletimber	22,148	--	--	2,197	--	2,485	--	--
Sapling & seedling	13,928	--	--	1,849	1,924	--	--	3,713
All stands	80,802	--	--	4,046	1,924	2,485	5,111	3,713
Paper birch								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	12,779	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	12,779	--	--	--	--	--	--	--
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Nonstocked	1,871	569	1,302	--	--	--	--	--
All types								
Sawtimber	2,313,030	--	3,524	17,190	33,800	100,883	101,415	94,558
Poletimber	338,375	--	675	8,697	3,917	15,530	17,903	7,886
Sapling & seedling	121,170	--	3,188	7,124	11,545	15,429	3,532	19,716
Nonstocked	1,871	569	1,302	--	--	--	--	--
All stands	2,774,446	569	8,689	33,011	49,262	131,842	122,850	122,160

(Table 37 continued on next page)

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Oak-hickory							
Sawtimber	130,270	154,432	108,394	263,953	134,313	124,730	--
Poletimber	7,935	4,637	8,161	4,450	10,275	--	--
Sapling & seedling	--	--	--	2,585	--	--	--
All stands	138,205	159,069	116,555	270,988	144,588	124,730	--
Elm-ash-soft maple							
Sawtimber	30,068	11,372	68,315	72,284	--	23,454	30,839
Poletimber	2,370	8,411	6,104	22,030	8,191	36,900	--
Sapling & seedling	718	7,225	--	--	--	--	--
All stands	33,156	27,008	74,419	94,314	8,191	60,354	30,839
Maple-birch							
Sawtimber	92,473	66,156	101,881	120,609	127,692	61,418	44,290
Poletimber	9,717	10,580	14,228	30,447	17,496	19,639	--
Sapling & seedling	12,073	21,775	--	4,691	--	--	--
All stands	114,263	98,511	116,109	155,747	145,188	81,057	44,290
Aspen							
Sawtimber	--	--	11,344	28,271	--	--	--
Poletimber	2,823	1,579	13,064	--	--	--	--
Sapling & seedling	--	--	6,442	--	--	--	--
All stands	2,823	1,579	30,850	28,271	--	--	--
Paper birch							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	12,779	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	12,779	--	--	--
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	--	--	--	--	--	--	--
All types							
Sawtimber	258,871	231,960	289,934	485,117	338,634	243,724	113,420
Poletimber	24,763	27,561	44,136	72,426	36,955	77,926	--
Sapling & seedling	12,791	32,229	6,442	7,276	1,898	--	--
Nonstocked	--	--	--	--	--	--	--
All stands	296,425	291,750	340,512	564,819	377,487	321,650	113,420

Table 38.--Net volume of sawtimber on commercial forest land by species group and butt log grade, Southeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All grades	Butt log grade			
		1	2	3	Tie and timber
Softwoods					
Jack pine	3,561	86	267	3,208	--
Red pine	41,833	8,946	2,801	30,086	--
White pine	57,630	--	44,955	12,675	--
White spruce	11,350	--	--	11,350	--
Black spruce	--	--	--	--	--
Balsam fir	2,000	--	--	2,000	--
Hemlock	5,006	--	--	5,006	--
Tamarack	23,041	--	--	23,041	--
Eastern white-cedar	1,734	--	--	1,734	--
Northern white-cedar	179,244	--	--	179,244	--
Other softwoods	--	--	--	--	--
Total	325,399	9,032	48,023	268,344	--
Hardwoods					
White oak	489,711	37,832	142,540	251,984	57,355
Select red oak	337,065	46,691	72,031	218,343	--
Other red oak	181,417	--	7,311	169,237	4,869
Select hickory	96,411	--	--	96,411	--
Other hickory	12,407	--	--	12,407	--
Basswood	96,363	11,993	37,554	46,816	--
Beech	53,080	--	12,318	40,762	--
Yellow birch	9,302	--	1,953	6,354	995
Hard maple	242,902	16,177	73,464	153,261	--
Soft maple	180,078	--	47,855	132,223	--
Elm	109,250	--	31,046	78,204	--
Black ash	49,617	--	--	49,617	--
White & green ash	215,431	68,334	24,166	111,844	11,087
Cottonwood	15,931	5,048	899	9,068	916
Willow	46,317	--	29,476	16,841	--
Hackberry	3,841	--	--	3,841	--
Balsam poplar	11,434	--	--	11,434	--
Bigtooth aspen	61,791	--	11,199	50,592	--
Quaking aspen	60,688	--	--	60,688	--
Paper birch	26,361	--	--	26,361	--
River birch	--	--	--	--	--
Black cherry	110,756	8,358	43,026	52,280	7,092
Black walnut	23,844	--	--	23,844	--
Butternut	6,018	--	1,259	4,759	--
Other hardwoods	9,032	--	--	9,032	--
Total	2,449,047	194,433	536,097	1,636,203	82,314
All species	2,774,446	203,465	584,120	1,904,547	82,314

[1/] International 1/4-inch rule.

Table 39.--Net volume of short-log trees on commercial forest land by species group and diameter class, Southeast Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	954	338	184	163	269	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	954	338	184	163	269	--	--	--	--	--	--
Hardwoods											
White oak	13,648	--	616	2,067	2,523	1,033	876	2,358	3,001	1,174	--
Select red oak	4,712	--	--	211	884	--	559	1,505	694	859	--
Other red oak	7,551	--	329	952	1,264	665	2,299	494	1,072	316	160
Select hickory	1,912	--	182	712	884	134	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	3,341	--	--	--	1,105	266	1,260	247	463	--	--
Beech	587	--	--	--	380	--	--	--	207	--	--
Yellow birch	207	--	--	207	--	--	--	--	--	--	--
Hard maple	5,259	--	200	727	821	493	328	937	684	1,069	--
Soft maple	4,798	--	262	157	200	1,339	408	289	955	438	750
Elm	2,319	--	312	--	574	226	279	251	677	--	--
Black ash	156	--	--	--	156	--	--	--	--	--	--
White & green ash	2,677	--	352	470	229	209	--	--	1,417	--	--
Cottonwood	389	--	156	233	--	--	--	--	--	--	--
Willow	1,889	--	--	379	207	202	211	416	213	261	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	327	--	--	--	--	327	--	--	--	--	--
Bigtooth aspen	1,121	--	--	1,121	--	--	--	--	--	--	--
Quaking aspen	428	--	--	178	250	--	--	--	--	--	--
Paper birch	--	--	--	--	--	--	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	2,742	--	--	946	871	--	211	252	462	--	--
Black walnut	320	--	--	--	--	--	320	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	930	--	281	133	211	148	--	--	--	157	--
Total	55,313	--	2,690	8,493	10,559	5,042	6,751	6,749	9,845	4,274	910
All species	56,267	338	2,874	8,656	10,828	5,042	6,751	6,749	9,845	4,274	910

Table 40.--Net volume of short-log trees on commercial forest land by species group and diameter class, Southeast Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 22.9	23.0- 28.9	29.0- 38.9	39.0+
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	3,298	1,116	626	580	976	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	3,298	1,116	626	580	976	--	--	--	--	--	--
Hardwoods											
White oak	35,204	--	1,723	5,541	6,603	2,609	2,221	5,974	7,578	2,955	--
Select red oak	10,797	--	--	458	1,996	--	1,286	3,420	1,602	2,035	--
Other red oak	17,277	--	710	2,144	2,829	1,516	5,244	1,141	2,534	762	397
Select hickory	5,250	--	534	1,989	2,358	369	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	7,260	--	--	--	2,378	559	2,755	546	1,022	--	--
Beech	1,598	--	--	--	1,041	--	--	--	557	--	--
Yellow birch	495	--	--	495	--	--	--	--	--	--	--
Hard maple	13,182	--	448	1,699	2,000	1,194	827	2,385	1,764	2,865	--
Soft maple	12,439	--	865	495	518	3,436	1,054	715	2,384	1,100	1,872
Elm	5,997	--	803	--	1,424	579	714	659	1,818	--	--
Black ash	420	--	--	--	420	--	--	--	--	--	--
White & green ash	6,080	--	884	1,156	526	486	--	--	3,028	--	--
Cottonwood	1,166	--	474	692	--	--	--	--	--	--	--
Willow	5,780	--	--	1,076	597	616	646	1,306	679	860	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	799	--	--	--	--	799	--	--	--	--	--
Bigtooth aspen	1,797	--	--	1,797	--	--	--	--	--	--	--
Quaking aspen	978	--	--	401	577	--	--	--	--	--	--
Paper birch	--	--	--	--	--	--	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	7,019	--	--	2,486	2,251	--	546	605	1,131	--	--
Black walnut	793	--	--	--	--	--	793	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	3,388	--	1,016	476	749	541	--	--	--	606	--
Total	137,719	--	7,457	20,905	26,267	12,704	16,086	16,751	24,097	11,183	2,269
All species	141,017	1,116	8,083	21,485	27,243	12,704	16,086	16,751	24,097	11,183	2,269

[1/] International 1/4-inch rule.

Table 41.--Net annual growth of growing stock on commercial forest land by softwoods and hardwoods, Southeast Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967[1/]	1982
Softwoods	4,600	6,107
Hardwoods	13,700	17,291
All species	18,300	23,398

[1/] Figures have been adjusted from those published after the 1968 survey to conform to 1982 volumes because of changes in survey procedures and volume equations.

Table 42.--Net annual growth of growing stock on commercial forest land by species group and county, Southeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County											
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Softwoods													
Jack pine	87	--	--	12	75	--	--	--	--	--	--	--	--
Red pine	2,026	--	--	751	--	--	--	240	--	28	886	--	--
White pine	875	--	--	44	24	88	33	--	92	140	--	58	14
White spruce	446	--	--	122	--	--	55	--	14	--	--	--	--
Black spruce	154	--	--	--	--	--	5	--	--	--	--	--	--
Balsam fir	64	--	--	--	--	--	64	--	--	--	--	--	--
Hemlock	99	4	--	--	--	--	14	--	--	--	--	--	79
Tamarack	1	--	--	4	18	--	-2	19	--	13	--	--	17
Eastern redcedar	127	30	--	6	11	--	66	--	--	--	--	--	--
Northern white-cedar	2,201	7	212	--	--	--	1,094	--	--	--	--	--	291
Other softwoods	27	--	--	--	--	--	--	--	--	--	--	27	--
Total	6,107	41	212	939	128	88	1,329	259	106	181	886	85	401
Hardwoods													
White oak	2,011	36	--	351	596	15	--	74	58	70	153	35	-12
Select red oak	1,304	89	9	109	159	18	52	50	55	49	110	25	4
Other red oak	1,365	--	--	578	343	--	--	40	11	191	3	3	--
Select hickory	836	--	6	33	98	--	--	30	37	37	38	21	--
Other hickory	337	--	6	12	116	180	--	--	5	--	--	1	13
Basswood	813	235	81	74	--	16	17	34	25	--	19	2	75
Beech	449	19	23	--	--	--	431	33	--	--	--	--	6
Yellow birch	200	27	58	--	--	--	10	--	--	--	--	--	67
Hard maple	1,817	195	12	--	--	9	362	117	60	--	152	--	258
Soft maple	1,650	478	9	7	40	16	80	37	--	105	1	--	119
Elm	-1,976	-162	-79	40	44	-47	-114	-10	-227	2	-55	2	-161
Black ash	1,220	92	--	--	--	27	146	26	80	--	22	--	22
White & green ash	2,421	312	187	21	--	89	300	27	17	--	121	22	168
Cottonwood	98	--	--	4	3	--	--	22	11	--	--	--	--
Willow	289	8	--	--	--	--	20	-11	--	--	--	--	34
Hackberry	15	--	--	10	--	--	--	--	--	--	5	--	--
Balsam poplar	27	--	--	--	--	--	26	--	--	--	--	--	--
Bigtooth aspen	386	34	--	36	67	4	129	--	34	--	--	--	-8
Quaking aspen	1,635	152	43	437	122	34	234	182	4	11	-43	--	-4
Paper birch	535	27	9	8	25	--	123	9	--	3	--	--	1
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	1,179	--	--	269	225	19	81	40	33	32	43	--	18
Black walnut	167	--	--	--	60	--	--	4	49	--	--	2	--
Butternut	63	7	--	2	--	--	--	--	4	--	--	--	37
Other hardwoods	450	--	26	149	168	8	-11	2	--	--	9	--	--
Total	17,291	1,549	390	2,140	2,066	388	1,886	706	256	500	578	113	637
All species	23,398	1,590	602	3,079	2,194	476	3,215	965	362	681	1,464	198	1,038

(Table 42 continued on next page)

(Table 42 continued)

Species group	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	95	--	--	9	17	--	--	--	--
White pine	153	--	117	--	--	--	96	--	16	--	--
White spruce	--	--	--	--	--	--	255	--	--	--	--
Black spruce	149	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	2	--	--	--	--	--	--	--	--	--	--
Tamarack	9	--	-22	-88	--	--	29	--	4	--	--
Eastern redcedar	--	--	14	--	--	--	--	--	--	--	--
Northern white-cedar	323	--	99	40	--	--	85	--	50	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	636	--	303	-48	--	9	482	--	70	--	--
Hardwoods											
White oak	8	--	48	13	13	250	26	175	25	62	15
Select red oak	57	--	20	--	11	51	113	39	25	155	104
Other red oak	--	--	--	--	13	145	10	17	--	11	--
Select hickory	--	--	--	--	19	253	27	97	18	10	112
Other hickory	--	--	4	--	--	--	--	--	--	--	--
Basswood	10	--	23	1	--	--	28	--	45	--	128
Beech	-34	--	-4	-17	--	--	-8	--	--	--	--
Yellow birch	-20	--	29	--	--	--	11	--	18	--	--
Hard maple	156	--	71	78	19	--	208	--	59	--	61
Soft maple	173	--	334	--	--	8	23	--	193	13	14
Elm	-668	--	-374	-171	--	57	5	7	-167	-72	174
Black ash	-2	--	390	23	--	--	15	--	216	54	109
White & green ash	229	--	271	81	26	39	280	--	65	--	166
Cottonwood	31	--	--	--	--	27	--	--	--	--	--
Willow	12	--	111	--	--	106	9	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	1	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	--	--	22	-14	--	--	24	--	--	--	58
Quaking aspen	212	--	58	--	7	--	30	34	18	83	21
Paper birch	68	--	137	92	--	--	33	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	34	--	19	--	9	77	27	126	87	40	--
Black walnut	--	--	--	--	--	45	--	7	--	--	--
Butternut	--	--	--	--	--	--	9	--	4	--	--
Other hardwoods	--	--	--	--	43	--	--	--	49	7	--
Total	267	--	1,159	86	160	1,058	870	502	655	363	962
All species	903	--	1,462	38	160	1,067	1,352	502	725	363	962

Table 43.--Net annual growth of sawtimber on commercial forest land by species group and county, Southeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County											
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Softwoods													
Jack pine	126	--	--	--	126	--	--	--	--	--	--	--	--
Red pine	2,554	--	--	--	--	--	--	1,574	--	--	117	--	--
White pine	2,713	--	--	89	--	--	195	--	521	--	--	385	91
White spruce	724	--	--	--	--	--	450	--	78	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	732	--	--	--	--	--	732	--	--	--	--	--	--
Hemlock	133	21	--	--	--	--	22	--	--	--	--	--	79
Tamarack	449	--	--	25	103	--	-61	114	--	--	--	--	178
Eastern redcedar	61	--	--	--	61	--	--	--	--	--	--	--	--
Northern white-cedar	6,720	--	467	--	--	--	2,707	--	--	--	--	--	1,363
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	14,212	21	467	114	290	--	4,045	1,688	599	--	117	385	1,711
Hardwoods													
White oak	11,400	143	--	2,906	3,973	75	--	315	244	77	583	232	-58
Select red oak	7,353	422	95	828	883	91	114	244	292	247	496	171	24
Other red oak	6,034	--	--	2,548	2,029	--	--	289	20	150	16	12	--
Select hickory	3,326	--	87	109	1,278	--	--	78	33	194	379	111	--
Other hickory	645	--	--	--	93	549	--	--	--	--	--	3	--
Basswood	2,718	572	244	353	--	84	80	63	16	--	103	--	349
Beech	319	-4	20	--	--	--	78	462	--	--	--	--	-7
Yellow birch	87	96	1	--	--	--	18	--	--	--	--	--	-15
Hard maple	7,511	1,121	68	--	--	51	1,753	380	238	--	696	--	1,262
Soft maple	6,065	2,139	8	27	122	102	491	45	--	--	--	--	682
Elm	-8,847	-599	-361	290	85	-115	-724	688	-1,183	--	-346	30	-647
Black ash	4,036	--	--	--	--	44	127	29	2,369	--	36	--	134
White & green ash	8,435	1,007	372	83	--	319	1,488	121	-63	--	402	140	395
Cottonwood	207	--	--	21	14	--	--	26	59	--	--	--	--
Willow	1,081	38	--	--	--	--	5	-41	--	--	--	--	159
Hackberry	110	--	--	87	--	--	--	--	--	--	23	--	--
Balsam poplar	47	--	--	--	--	--	47	--	--	--	--	--	--
Bigtooth aspen	2,538	452	--	220	369	107	717	--	-61	--	--	--	-41
Quaking aspen	4,357	50	--	894	393	75	1,098	24	--	--	--	--	-70
Paper birch	755	-67	51	--	--	--	156	14	--	--	--	--	-4
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	3,847	---	--	385	1,231	79	506	469	123	121	63	--	--
Black walnut	680	--	--	--	291	--	--	18	207	--	--	9	--
Butternut	108	32	--	--	--	--	--	--	18	--	--	--	39
Other hardwoods	286	--	31	--	234	--	-62	--	--	--	--	--	--
Total	63,098	5,402	616	8,751	10,995	1,461	5,892	3,224	2,312	789	2,451	708	2,202
All species	77,310	5,423	1,083	8,865	11,285	1,461	9,937	4,912	2,911	789	2,568	1,093	3,913

(Table 43 continued on next page)

[1/] International 1/4-inch rule

(Table 43 continued)

Species group	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	812	--	--	51	--	--	--	--	--
White pine	862	--	524	--	--	--	46	--	--	--	--
White spruce	--	--	--	--	--	--	196	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	11	--	--	--	--	--	--	--	--	--	--
Tamarack	12	--	-36	--	--	--	93	--	21	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	845	--	308	285	--	--	399	--	346	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	1,730	--	1,608	285	--	51	734	--	367	--	--
Hardwoods											
White oak	96	--	260	63	47	1,082	111	821	112	250	68
Select red oak	347	--	71	--	57	265	623	442	132	726	783
Other red oak	--	--	--	--	61	701	23	81	--	104	--
Select hickory	--	--	--	--	23	165	76	580	97	34	82
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	115	--	76	8	--	--	162	--	271	--	222
Beech	-175	--	-32	22	--	--	-45	--	--	--	--
Yellow birch	-68	--	--	--	--	--	35	--	20	--	--
Hard maple	1,037	--	65	-132	98	--	558	--	286	--	30
Soft maple	811	--	1,015	--	--	--	230	--	364	29	--
Elm	-2,684	--	-1,349	-565	--	-16	46	--	-1,004	-315	-78
Black ash	64	--	581	71	--	--	112	--	21	448	--
White & green ash	2,079	--	396	325	19	40	344	--	457	--	511
Cottonwood	60	--	--	--	--	27	--	--	--	--	--
Willow	57	--	745	--	--	118	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	102	--	342	--	--	--	16	--	--	--	315
Quaking aspen	1,091	--	352	--	--	--	108	22	147	131	42
Paper birch	21	--	240	273	--	--	71	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	32	--	126	--	--	242	--	307	55	108	--
Black walnut	--	--	--	--	--	120	--	35	--	--	--
Butternut	--	--	--	--	--	--	--	--	19	--	--
Other hardwoods	--	--	--	--	--	--	--	--	58	25	--
Total	2,985	--	2,888	65	305	2,744	2,470	2,288	1,035	1,540	1,975
All species	4,715	--	4,496	350	305	2,795	3,204	2,288	1,402	1,540	1,975

Table 44.--Net annual growth of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Southeast Unit, Wisconsin, 1982

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	- - - - Thousand cubic feet - - - -			- - - Thousand board feet[1] - - -		
National Forest	--	--	--	--	--	--
Miscellaneous federal	12	--	12	98	--	98
State	1,389	421	968	4,341	2,668	1,673
County and municipal	470	21	449	2,059	--	2,059
Indian	--	--	--	--	--	--
Forest industry	350	161	189	959	115	844
Farmer	11,025	2,402	8,623	41,174	6,955	34,219
Misc. private-corp.	1,007	249	758	3,810	1,151	2,659
Misc. private-indiv.	9,145	2,853	6,292	24,869	3,323	21,546
All owners	23,398	6,107	17,291	77,310	14,212	63,098

[1] International 1/4-inch rule.

Table 45.--Net annual growth of growing stock on commercial forest land by species group and type, Southeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All types	Forest type							
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack
Softwoods									
Jack pine	87	61	--	--	--	--	--	--	--
Red pine	2,026	--	1,877	123	--	17	--	--	--
White pine	875	24	--	596	--	--	--	39	7
White spruce	446	--	--	14	--	255	--	17	--
Black spruce	154	--	--	--	--	--	149	5	--
Balsam fir	64	--	--	--	--	--	--	32	--
Hemlock	99	--	--	--	--	--	--	10	--
Tamarack	1	--	--	--	--	--	--	-6	57
Eastern redcedar	127	--	--	--	--	--	--	--	--
Northern white-cedar	2,201	--	--	--	--	--	--	1,386	--
Other softwoods	27	--	--	27	--	--	--	--	--
Total	6,107	85	1,877	760	--	272	149	1,483	64
Hardwoods									
White oak	2,011	--	--	--	--	--	--	--	--
Select red oak	1,304	--	--	--	--	--	--	--	--
Other red oak	1,365	--	14	--	--	--	--	--	--
Select hickory	836	--	--	--	--	--	--	13	--
Other hickory	337	--	--	--	--	--	--	4	--
Basswood	813	--	--	--	--	--	--	26	--
Beech	449	--	--	--	--	--	--	--	--
Yellow birch	200	--	--	--	--	--	--	69	--
Hard maple	1,817	--	--	--	--	--	--	7	--
Soft maple	1,650	9	--	--	--	--	--	24	--
Elm	-1,976	--	--	-4	--	--	--	-123	13
Black ash	1,220	--	--	--	--	--	--	18	20
White & green ash	2,421	--	--	--	--	16	--	4	--
Cottonwood	98	--	--	--	--	--	--	--	--
Willow	289	--	--	--	--	--	--	8	--
Hackberry	15	--	--	--	--	--	--	--	--
Balsam poplar	27	--	--	--	--	--	--	--	--
Bigtooth aspen	386	--	--	15	--	--	--	--	--
Quaking aspen	1,635	--	--	--	--	--	189	69	--
Paper birch	535	--	--	--	--	--	--	84	3
River birch	--	--	--	--	--	--	--	--	--
Black cherry	1,179	--	--	14	--	--	--	--	--
Black walnut	167	--	--	--	--	--	--	--	--
Butternut	63	--	--	--	--	--	--	--	--
Other hardwoods	450	--	--	--	--	--	--	--	--
Total	17,291	9	14	25	--	16	189	203	36
All species	23,398	94	1,891	785	--	288	338	1,686	100

(Table 45 contnued on next page)

(Table 45 continued)

Species group	Forest type						
	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods							
Jack pine	26	--	--	--	--	--	--
Red pine	9	--	--	--	--	--	--
White pine	8	8	183	--	--	--	10
White spruce	122	38	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--
Balsam fir	--	--	--	32	--	--	--
Hemlock	--	22	62	5	--	--	--
Tamarack	--	28	-94	10	6	--	--
Eastern redcedar	47	80	--	--	--	--	--
Northern white-cedar	--	366	332	77	40	--	--
Other softwoods	--	--	--	--	--	--	--
Total	212	542	483	124	46	--	10
Hardwoods							
White oak	1,752	37	215	7	--	--	--
Select red oak	888	33	377	6	--	--	--
Other red oak	1,069	16	169	97	--	--	--
Select hickory	663	--	147	13	--	--	--
Other hickory	225	--	108	--	--	--	--
Basswood	65	65	657	--	--	--	--
Beech	--	--	449	--	--	--	--
Yellow birch	--	65	66	--	--	--	--
Hard maple	133	23	1,639	15	--	--	--
Soft maple	25	1,092	476	24	--	--	--
Elm	-264	-823	-715	-12	24	--	-72
Black ash	48	850	233	68	-17	--	--
White & green ash	126	1,186	1,041	36	12	--	--
Cottonwood	24	54	--	20	--	--	--
Willow	--	226	46	9	--	--	--
Hackberry	15	--	--	--	--	--	--
Balsam poplar	--	16	-5	16	--	--	--
Bigtooth aspen	133	10	197	31	--	--	--
Quaking aspen	129	176	498	567	7	--	--
Paper birch	36	170	97	77	68	--	--
River birch	--	--	--	--	--	--	--
Black cherry	558	--	480	127	--	--	--
Black walnut	155	--	12	--	--	--	--
Butternut	6	4	53	--	--	--	--
Other hardwoods	50	124	276	--	--	--	--
Total	5,836	3,324	6,516	1,101	94	—	-72
All species	6,048	3,866	6,999	1,225	140	--	-62

Table 46.--Net annual growth of sawtimber on commercial forest land by species group and type, Southeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All types	Forest type							
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack
Softwoods									
Jack pine	126	--	--	--	--	--	--	--	--
Red pine	2,554	--	1,691	812	--	--	--	--	--
White pine	2,713	--	--	1,537	--	--	--	136	--
White spruce	724	--	--	78	--	196	--	117	--
Black spruce	--	--	--	--	--	--	--	--	--
Balsam fir	732	--	--	--	--	--	--	24	--
Hemlock	133	--	--	--	--	--	--	67	--
Tamarack	449	--	--	--	--	--	--	163	128
Eastern redcedar	61	--	--	--	--	--	--	--	--
Northern white-cedar	6,720	--	--	--	--	--	--	2,964	--
Other softwoods	--	--	--	--	--	--	--	--	--
Total	14,212	--	1,691	2,427	--	196	--	3,471	128
Hardwoods									
White oak	11,400	--	--	--	--	--	--	9	--
Select red oak	7,353	--	--	--	--	--	--	--	--
Other red oak	6,034	--	67	--	--	--	--	--	--
Select hickory	3,326	--	--	--	--	--	--	76	--
Other hickory	645	--	--	--	--	--	--	--	--
Basswood	2,718	--	--	--	--	--	--	135	--
Beech	319	--	--	--	--	--	--	--	--
Yellow birch	87	--	--	--	--	--	--	--	--
Hard maple	7,511	--	--	--	--	--	--	89	--
Soft maple	6,065	--	--	--	--	--	--	160	--
Elm	-8,847	--	--	78	--	--	--	-453	82
Black ash	4,036	--	--	--	--	--	--	--	--
White & green ash	8,435	--	--	--	--	--	--	16	--
Cottonwood	207	--	--	--	--	--	--	--	--
Willow	1,081	--	--	--	--	--	--	37	--
Hackberry	110	--	--	--	--	--	--	--	--
Balsam poplar	47	--	--	--	--	--	--	--	--
Bigtooth aspen	2,538	--	--	--	--	--	--	--	--
Quaking aspen	4,357	--	--	--	--	--	--	984	--
Paper birch	755	--	--	--	--	--	--	183	--
River birch	--	--	--	--	--	--	--	--	--
Black cherry	3,847	--	--	--	--	--	--	--	--
Black walnut	680	--	--	--	--	--	--	--	--
Butternut	108	--	--	--	--	--	--	--	--
Other hardwoods	286	--	--	--	--	--	--	--	--
Total	63,098	--	67	78	--	--	--	1,236	82
All species	77,310	--	1,758	2,505	--	196	--	4,707	210

(Table 46 continued on next page)

[1/] International 1/4-inch rule.

(Table 46 continued)

Species group	Forest type						
	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods							
Jack pine	126	--	--	--	--	--	--
Red pine	51	--	--	--	--	--	--
White pine	66	52	863	--	--	--	59
White spruce	--	333	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--
Balsam fir	--	--	--	708	--	--	--
Hemlock	--	22	33	11	--	--	--
Tamarack	--	158	--	--	--	--	--
Eastern redcedar	61	--	--	--	--	--	--
Northern white-cedar	--	1,715	781	975	285	--	--
Other softwoods	--	--	--	--	--	--	--
Total	304	2,280	1,677	1,694	285	--	59
Hardwoods							
White oak	9,687	329	1,349	26	--	--	--
Select red oak	5,152	137	2,035	29	--	--	--
Other red oak	5,404	--	163	400	--	--	--
Select hickory	2,823	--	427	--	--	--	--
Other hickory	645	--	--	--	--	--	--
Basswood	131	306	2,146	--	--	--	--
Beech	--	--	319	--	--	--	--
Yellow birch	--	37	50	--	--	--	--
Hard maple	260	90	6,990	82	--	--	--
Soft maple	181	3,588	2,097	39	--	--	--
Elm	-1,223	-3,906	-3,291	101	119	--	-354
Black ash	36	3,941	59	--	--	--	--
White & green ash	527	4,382	3,239	97	174	--	--
Cottonwood	21	172	--	14	--	--	--
Willow	--	747	297	--	--	--	--
Hackberry	110	--	--	--	--	--	--
Balsam poplar	--	-84	7	124	--	--	--
Bigtooth aspen	639	278	1,374	247	--	--	--
Quaking aspen	105	305	186	2,777	--	--	--
Paper birch	71	252	-24	--	273	--	--
River birch	--	--	--	--	--	--	--
Black cherry	1,768	--	1,659	420	--	--	--
Black walnut	542	--	138	--	--	--	--
Butternut	18	19	71	--	--	--	--
Other hardwoods	84	122	80	--	--	--	--
Total	26,981	10,715	19,371	4,356	566	--	-354
All species	27,285	12,995	21,048	6,050	851	--	-295

Table 47.--Net annual growth of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Southeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	94	--	--	--	--	--	--	--	--	94	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	94	--	--	--	--	--	--	--	--	94	--	--	--	--	--
Red pine															
Sawtimber	240	--	--	--	--	--	--	--	--	--	--	--	--	240	--
Poletimber	1,011	--	--	--	--	--	--	125	--	886	--	--	--	--	--
Sapling & seedling	640	--	--	--	--	--	--	--	--	--	--	--	640	--	--
All stands	1,891	--	--	--	--	--	--	125	--	886	--	--	640	240	--
White pine															
Sawtimber	319	--	--	--	106	--	--	--	--	--	--	--	213	--	--
Poletimber	466	--	--	--	--	--	--	--	85	--	168	213	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	785	--	--	--	106	--	--	--	85	--	168	213	213	--	--
Balsam fir															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	288	--	--	--	--	--	--	--	--	--	288	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	288	--	--	--	--	--	--	--	--	--	288	--	--	--	--
Black spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	338	--	--	--	--	--	--	338	--	--	--	--	--	--	--
All stands	338	--	--	--	--	--	--	338	--	--	--	--	--	--	--
Northern white-cedar															
Sawtimber	586	--	--	--	--	20	--	--	20	--	--	--	218	115	213
Poletimber	733	--	--	--	--	--	--	--	--	220	--	53	121	339	--
Sapling & seedling	367	--	--	62	--	--	--	--	166	44	--	95	--	--	--
All stands	1,686	--	--	62	--	20	--	--	186	264	--	148	339	454	213

(Table 47 continued on next page)

(Table 47 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	39	--	--	39	--	--	--	--	--	--	--	--	--	--	--
Poletimber	50	--	--	--	--	--	32	--	--	18	--	--	--	--	--
Sapling & seedling	11	--	11	--	--	--	--	--	--	--	--	--	--	--	--
All stands	100	--	11	39	--	--	32	--	--	18	--	--	--	--	--
Oak-hickory															
Sawtimber	5,130	--	-36	42	-57	119	145	370	757	997	549	1,057	855	332	--
Poletimber	791	--	--	--	--	--	167	--	38	223	140	166	57	--	--
Sapling & seedling	127	5	5	13	--	35	39	--	--	--	--	30	--	--	--
All stands	6,048	5	-31	55	-57	154	351	370	795	1,220	689	1,253	912	332	--
Elm-ash-soft maple															
Sawtimber	1,103	--	--	66	57	131	138	64	-147	31	69	411	--	266	17
Poletimber	2,421	--	180	177	100	91	204	149	17	160	148	333	91	771	--
Sapling & seedling	342	--	-9	--	109	105	--	78	22	37	--	--	--	--	--
All stands	3,866	--	171	243	266	327	342	291	-108	228	217	744	91	1,037	17
Maple-birch															
Sawtimber	3,763	--	--	--	105	-156	232	589	423	351	247	582	724	284	382
Poletimber	2,478	--	--	56	--	144	-18	--	604	265	333	368	208	518	--
Sapling & seedling	758	--	--	--	55	137	13	57	163	318	--	15	--	--	--
All stands	6,999	--	--	56	160	125	227	646	1,190	934	580	965	932	802	382
Aspen															
Sawtimber	308	--	--	--	--	--	45	--	--	--	57	206	--	--	--
Poletimber	691	--	--	100	--	35	65	--	90	16	385	--	--	--	--
Sapling & seedling	226	--	27	18	18	68	--	41	--	35	19	--	--	--	--
All stands	1,225	--	27	118	18	103	110	41	90	51	461	206	--	--	--
Paper birch															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	133	--	--	--	--	--	--	--	--	--	--	133	--	--	--
Sapling & seedling	7	--	7	--	--	--	--	--	--	--	--	--	--	--	--
All stands	140	--	7	--	--	--	--	--	--	--	--	133	--	--	--
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	-62	10	-72	--	--	--	--	--	--	--	--	--	--	--	--
All types															
Sawtimber	11,488	--	-36	147	211	114	560	1,023	1,053	1,379	922	2,256	2,010	1,237	612
Poletimber	9,156	--	180	333	100	270	450	274	834	1,882	1,462	1,266	477	1,628	--
Sapling & seedling	2,816	5	41	93	182	345	52	514	351	434	19	140	640	--	--
Nonstocked	-62	10	-72	--	--	--	--	--	--	--	--	--	--	--	--
All stands	23,398	15	113	573	493	729	1,062	1,811	2,238	3,695	2,403	3,662	3,127	2,865	612

Table 48.--Net annual growth of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Southeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Red pine															
Sawtimber	1,574	--	--	--	--	--	--	--	--	--	--	--	--	1,574	--
Poletimber	117	--	--	--	--	--	--	--	--	117	--	--	--	--	--
Sapling & seedling	67	--	--	--	--	--	--	--	--	--	--	--	67	--	--
All stands	1,758	--	--	--	--	--	--	--	--	117	--	--	67	1,574	--
White pine															
Sawtimber	2,074	--	--	--	599	--	--	--	--	--	--	--	1,475	--	--
Poletimber	431	--	--	--	--	--	--	--	385	--	--	46	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	2,505	--	--	--	599	--	--	--	385	--	--	46	1,475	--	--
Balsam fir															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	196	--	--	--	--	--	--	--	--	--	196	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	196	--	--	--	--	--	--	--	--	--	196	--	--	--	--
Black spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar															
Sawtimber	2,903	--	--	--	--	233	--	--	162	--	--	--	1,491	371	646
Poletimber	1,571	--	--	--	--	--	--	--	--	32	--	728	10	801	--
Sapling & seedling	233	--	--	143	--	--	--	--	--	90	--	--	--	--	--
All stands	4,707	--	--	143	--	233	--	--	162	122	--	728	1,501	1,172	646

(Table 48 continued on next page)

[1/] International 1/4-inch rule.

(Table 48 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	114	--	--	114	--	--	--	--	--	--	--	--	--	--	--
Poletimber	82	--	--	--	--	--	82	--	--	--	--	--	--	--	--
Sapling & seedling	14	--	14	--	--	--	--	--	--	--	--	--	--	--	--
All stands	210	--	14	114	--	--	82	--	--	--	--	--	--	--	--
Oak-hickory															
Sawtimber	25,163	--	-167	205	-258	672	791	3,159	5,112	2,522	2,633	4,764	3,631	2,099	--
Poletimber	1,808	--	--	--	--	--	53	--	2	-52	1,169	123	513	--	--
Sapling & seedling	314	--	24	30	--	--	154	--	--	--	--	106	--	--	--
All stands	27,285	--	-143	235	-258	672	998	3,159	5,114	2,470	3,802	4,993	4,144	2,099	--
Elm-ash-soft maple															
Sawtimber	6,809	--	--	210	122	607	1,351	264	-299	290	817	2,292	--	946	209
Poletimber	4,563	--	-72	246	120	156	127	2,305	93	-205	82	354	132	1,225	--
Sapling & seedling	1,623	--	-75	--	1,189	113	--	231	32	133	--	--	--	--	--
All stands	12,995	--	-147	456	1,431	876	1,478	2,800	-174	218	899	2,646	132	2,171	209
Maple-birch															
Sawtimber	14,776	--	--	--	374	-294	979	1,363	812	1,099	2,026	1,689	3,535	1,192	2,001
Poletimber	4,394	--	--	--	--	260	-127	--	860	130	545	717	933	1,076	--
Sapling & seedling	1,878	--	--	--	260	566	--	333	83	483	--	153	--	--	--
All stands	21,048	--	--	--	634	532	852	1,696	1,755	1,712	2,571	2,559	4,468	2,268	2,001
Aspen															
Sawtimber	3,336	--	--	--	--	--	242	--	--	--	507	2,587	--	--	--
Poletimber	2,423	--	--	89	--	129	--	--	758	113	1,334	--	--	--	--
Sapling & seedling	291	--	--	31	56	--	--	162	--	--	42	--	--	--	--
All stands	6,050	--	--	120	56	129	242	162	758	113	1,883	2,587	--	--	--
Paper birch															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	851	--	--	--	--	--	--	--	--	--	--	851	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	851	--	--	--	--	--	--	--	--	--	--	851	--	--	--
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	-295	59	-354	--	--	--	--	--	--	--	--	--	--	--	--
All types															
Sawtimber	56,749	--	-167	529	837	1,218	3,363	4,786	5,787	3,911	5,983	11,332	10,132	6,182	2,856
Poletimber	16,436	--	-72	335	120	545	135	2,305	2,098	135	3,326	2,819	1,588	3,102	--
Sapling & seedling	4,420	--	-37	204	1,505	679	154	726	115	706	42	259	67	--	--
Nonstocked	-295	59	-354	--	--	--	--	--	--	--	--	--	--	--	--
All stands	77,310	59	-630	1,068	2,462	2,442	3,652	7,817	8,000	4,752	9,351	14,410	11,787	9,284	2,856

Table 49.--Timber removals from growing stock on commercial forest land by species group and county, Southeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County											
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Softwoods													
Jack pine	18	--	--	18	--	--	--	--	--	--	--	--	--
Red pine	156	--	--	138	--	--	--	1/	--	12	--	--	--
White pine	106	--	--	20	--	--	18	--	--	5	--	--	11
White spruce	1/	--	--	--	--	--	1/	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	1	--	--	--	--	--	1	--	--	--	--	--	--
Hemlock	36	--	--	--	--	--	9	--	--	--	--	--	15
Tamarack	1	--	--	--	--	--	1	--	--	--	--	--	1/
Northern white-cedar	540	5	1/	--	--	--	206	--	--	--	--	--	152
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	858	5	1/	176	--	--	235	1/	--	17	--	--	178
Hardwoods													
White oak	1,318	22	--	464	235	55	--	41	38	34	42	7	--
Select red oak	1,027	49	12	189	112	62	21	12	66	23	31	8	9
Other red oak	757	--	--	326	239	--	--	16	9	14	1	1	--
Hickory	73	--	1/	2	7	3	--	6	2	1	8	1	1
Basswood	220	10	21	53	--	4	7	8	9	--	4	--	11
Beech	79	4	2	--	--	--	35	3	--	--	--	--	8
Yellow birch	41	9	1	--	--	--	24	--	--	--	--	--	1
Hard maple	497	17	24	--	--	17	31	13	7	--	12	--	19
Soft maple	726	23	7	14	4	7	9	15	--	1	--	--	99
Elm	562	83	5	37	5	7	78	49	54	1	9	6	8
Ash	663	17	10	12	--	23	31	8	8	--	9	1	28
Cottonwood	19	--	--	2	1/	--	--	1	1	--	--	--	--
Balsam poplar	11	--	--	--	--	--	10	--	--	--	--	--	--
Bigtooth aspen	157	9	--	4	9	2	10	--	1	--	--	--	13
Quaking aspen	381	25	2	19	13	2	80	4	--	2	--	--	9
Paper birch	265	35	1/	14	1	--	180	2	--	--	--	--	7
Black walnut	35	--	--	--	12	--	--	--	11	--	--	1/	--
Other hardwoods 2/	393	8	1	30	270	9	3	10	7	1	17	--	2
Total	7,224	311	85	1,166	907	191	519	188	213	77	133	24	215
All species	8,082	316	85	1,342	907	191	754	188	213	94	133	24	393

(Table 49 continued on next page)

1/ Less than 500 cubic feet.

2/ Includes black cherry and butternut.

(Table 49 continued)

Species group	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	6	--	--	--	--	--	--	--	--
White pine	28	--	8	--	--	--	16	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	12	--	--	--	--	--	--	--	--	--	--
Tamarack	1/	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	86	--	--	90	--	--	1	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	126	--	14	90	--	--	17	--	--	--	--
Hardwoods											
White oak	29	--	39	3	41	88	61	37	37	32	13
Select red oak	106	--	51	--	19	7	116	37	68	19	10
Other red oak	--	--	--	--	25	115	5	6	--	--	--
Hickory	--	--	8	--	9	4	4	7	4	4	2
Basswood	20	--	27	1	--	--	34	--	9	--	2
Beech	12	--	4	1	--	--	10	--	--	--	--
Yellow birch	--	--	3	--	--	--	1	--	2	--	--
Hard maple	50	--	195	2	13	--	59	--	35	--	3
Soft maple	281	--	202	--	--	13	27	--	5	8	11
Elm	10	--	140	2	--	30	23	--	6	6	3
Ash	75	--	334	12	6	3	46	--	31	2	7
Cottonwood	12	--	--	--	--	3	--	--	--	--	--
Balsam poplar	1	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	4	--	101	--	--	--	2	--	--	--	2
Quaking aspen	10	--	208	--	1	--	2	1	1	1	1
Paper birch	11	--	12	2	--	--	1	--	--	--	--
Black walnut	--	--	--	--	--	9	--	3	--	--	--
Other hardwoods 2/	2	--	16	--	1	9	2	3	1	1	--
Total	623	--	1,340	23	115	281	393	94	199	73	54
All species	749	--	1,354	113	115	281	410	94	199	73	54

1/ Less than 500 cubic feet.

2/ Includes black cherry and butternut.

Table 50.--Timber removals from sawtimber on commercial forest land by species group and county, Southeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County											
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Softwoods													
Jack pine	--	--	--	--	--	--	--	--	--	--	--	--	--
Red pine	15	--	--	--	--	--	--	1	--	--	--	--	--
White pine	488	--	--	75	--	--	93	--	--	20	--	--	58
White spruce	2	--	--	--	--	--	2	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	3	--	--	--	--	--	3	--	--	--	--	--	--
Hemlock	176	--	--	--	--	--	55	--	--	--	--	--	80
Tamarack	4	--	--	--	--	--	--	--	--	--	--	--	2
Northern white-cedar	924	--	2	--	--	--	353	--	--	--	--	--	284
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	1,612	--	2	75	--	--	506	1	--	20	--	--	424
Hardwoods													
White oak	5,285	106	--	1,698	819	231	--	192	190	162	174	18	--
Select red oak	4,543	238	64	629	503	261	98	54	332	122	122	25	41
Other red oak	2,630	--	--	955	880	--	--	50	29	45	5	2	--
Hickory	192	--	1	5	17	5	--	23	5	2	22	--	--
Basswood	876	35	86	155	--	18	24	34	37	--	21	--	49
Beech	300	18	5	--	--	--	117	4	--	--	--	--	35
Yellow birch	105	27	--	--	--	--	70	--	--	--	--	--	--
Hard maple	1,639	74	119	--	--	91	94	52	33	--	43	--	77
Soft maple	3,010	73	29	43	19	27	32	66	--	--	--	--	461
Elm	1,979	292	23	98	22	30	367	50	234	--	31	27	36
Ash	2,245	57	32	32	--	105	78	28	31	--	32	--	116
Cottonwood	87	--	--	15	2	--	--	2	--	--	--	--	--
Balsam poplar	37	--	--	--	--	--	35	--	--	--	--	--	--
Bigtooth aspen	777	47	--	18	26	4	41	--	--	--	--	--	104
Quaking aspen	796	35	--	37	30	2	73	12	--	--	--	--	--
Paper birch	576	--	1	--	--	--	458	10	--	--	--	--	26
Black walnut	181	--	--	--	61	--	--	--	56	--	--	2	--
Other hardwoods[2/]	999	26	--	80	650	29	5	25	26	2	60	--	2
Total	26,257	1,028	360	3,765	3,029	803	1,492	602	973	333	510	74	947
All species	27,869	1,028	362	3,840	3,029	803	1,998	603	973	353	510	74	1,371

(Table 50 continued on next page)

[1/] International 1/4-inch rule.

[2/] Includes black cherry and butternut.

(Table 50 continued)

Species group	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	14	--	--	--	--	--	--	--	--
White pine	158	--	42	--	--	--	42	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	41	--	--	--	--	--	--	--	--	--	--
Tamarack	2	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	165	--	--	113	--	--	7	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	366	--	56	113	--	--	49	--	--	--	--
Hardwoods											
White oak	133	--	162	10	203	367	293	150	175	138	64
Select red oak	525	--	207	--	97	36	569	171	338	71	40
Other red oak	--	--	--	--	121	495	20	28	--	--	--
Hickory	--	--	--	--	36	13	20	18	16	9	--
Basswood	98	--	120	5	--	--	158	--	34	--	2
Beech	57	--	13	1	--	--	50	--	--	--	--
Yellow birch	--	--	--	--	--	--	--	--	8	--	--
Hard maple	242	--	308	--	65	--	253	--	179	--	9
Soft maple	1,302	--	808	--	--	--	113	--	7	30	--
Elm	51	--	460	4	--	108	96	--	23	27	--
Ash	160	--	1,155	44	22	15	199	--	123	--	16
Cottonwood	54	--	--	--	--	14	--	--	--	--	--
Balsam poplar	2	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	12	--	518	--	--	--	4	--	--	--	3
Quaking aspen	39	--	561	--	--	--	7	--	--	--	--
Paper birch	44	--	35	--	--	--	2	--	--	--	--
Black walnut	--	--	--	--	--	41	--	21	--	--	--
Other hardwoods[2/]	4	--	49	--	--	31	--	8	2	--	--
Total	2,723	--	4,396	64	544	1,120	1,784	396	905	275	134
All species	3,089	--	4,452	177	544	1,120	1,833	396	905	275	134

[2/] Includes black cherry and butternut.

Table 51.--Average annual growing-stock removals on commercial forest land by species group and county, Southeast Unit, Wisconsin, 1967-1982

(In thousand cubic feet per year)

Species group	All counties	County											
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Softwoods													
Jack pine	--	--	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--	--	--
White pine	7	--	--	--	--	--	7	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	35	--	--	--	--	--	--	--	--	--	--	--	35
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	502	--	--	--	--	--	369	--	--	--	--	--	133
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	544	--	--	--	--	--	376	--	--	--	--	--	168
Hardwoods													
White oak	545	--	--	286	55	--	--	60	--	--	39	--	--
Select red oak	1,623	--	--	642	412	--	--	31	148	123	--	38	--
Other red oak	260	--	--	133	87	--	--	--	--	--	--	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	50	--	--	--	--	50	--	--	--	--	--	--	--
Basswood	9	--	--	--	--	--	--	--	--	--	--	9	--
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	--	--	--	--	--	--	--	--	--	--
Hard maple	118	--	--	--	--	--	--	--	--	--	--	--	--
Soft maple	1,874	867	--	--	--	--	--	41	--	--	36	--	--
Elm	1,554	530	--	--	--	23	81	41	402	--	--	--	247
Black ash	105	--	--	--	--	--	--	--	--	--	57	--	--
White and green ash	196	--	--	--	--	--	196	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	--	--	--	--	--	--	--	--	--	--	--	--	--
Quaking aspen	101	--	--	--	--	--	101	--	--	--	--	--	--
Paper birch	37	--	--	--	--	--	37	--	--	--	--	--	--
Black cherry	148	--	--	--	148	--	--	--	--	--	--	--	--
Black walnut	36	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	6,656	1,397	--	1,061	702	73	415	173	550	123	132	47	247
All species	7,200	1,397	--	1,061	702	73	791	173	550	123	132	47	415

(Table 51 continued on next page)

(Table 51 continued)

Species group	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--
Hardwoods											
White oak	--	--	--	--	--	--	40	65	--	--	--
Select red oak	--	--	--	--	--	--	139	--	--	--	90
Other red oak	--	--	--	--	--	--	--	--	--	40	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	--	--	--	--	--	--	--	--	--	--	--
Beech	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	118
Soft maple	119	--	790	--	--	--	--	--	--	--	21
Elm	--	--	126	--	--	--	--	--	--	--	104
Black ash	48	--	--	--	--	--	--	--	--	--	--
White and green ash	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	--	--	--	--	--	--	--	--	--	--	--
Quaking aspen	--	--	--	--	--	--	--	--	--	--	--
Paper birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	--	--	--	--	--	--	--	--	--	--	--
Black walnut	--	--	36	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--
Total	167	--	952	--	--	--	179	65	--	40	333
All species	167	--	952	--	--	--	179	65	--	40	333

Table 52.--Average annual sawtimber removals on commercial forest land by species group and county, Southeast Unit, Wisconsin, 1967-1982

(In thousand board feet per year)[1/]

Species group	All counties	County												
		Brown	Calumet	Columbia	Dane	Dodge	Door	Fond du Lac	Green	Green Lake	Jefferson	Kenosha	Kewaunee
Softwoods														
Jack pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White pine	36	--	--	--	--	--	36	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	305	--	--	--	--	--	145	--	--	--	--	--	--	160
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	341	--	--	--	--	--	181	--	--	--	--	--	--	160
Hardwoods														
White oak	2,725	--	--	1,425	283	--	--	306	--	--	191	--	--	--
Select red oak	8,128	--	--	3,152	2,051	--	--	166	760	619	--	188	--	--
Other red oak	847	--	--	643	--	--	--	--	--	--	--	--	--	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hickory	241	--	--	--	--	241	--	--	--	--	--	--	--	--
Basswood	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Soft maple	8,721	4,294	--	--	--	--	--	209	--	--	--	--	--	--
Elm	6,680	2,329	--	--	--	--	371	--	1,784	--	--	--	--	1,133
Black ash	297	--	--	--	--	--	--	--	--	--	297	--	--	--
White and green ash	922	--	--	--	--	--	922	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Quaking aspen	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Paper birch	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	639	--	--	--	639	--	--	--	--	--	--	--	--	--
Black walnut	185	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	29,385	6,623	--	5,220	2,973	241	1,293	681	2,544	619	488	188	1,133
All species	29,726	6,623	--	5,220	2,973	241	1,474	681	2,544	619	488	188	1,293

(Table 52 continued on next page)

[1/] International 1/4-inch rule.

(Table 52 continued)

Species group	County										
	Manitowoc	Milwaukee	Outagamie	Ozaukee	Racine	Rock	Sheboygan	Walworth	Washington	Waukesha	Winnebago
Softwoods											
Jack pine	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--
Hardwoods											
White oak	--	--	--	--	--	--	195	325	--	--	--
Select red oak	--	--	--	--	--	--	738	--	--	--	454
Other red oak	--	--	--	--	--	--	--	--	--	204	--
Select hickory	--	--	--	--	--	--	--	--	--	--	--
Other hickory	--	--	--	--	--	--	--	--	--	--	--
Basswood	--	--	--	--	--	--	--	--	--	--	--
Beech	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	--	--	--	--	--	--	--	--
Hard maple	--	--	--	--	--	--	--	--	--	--	--
Soft maple	514	--	3,704	--	--	--	--	--	--	--	--
Elm	--	--	589	--	--	--	--	--	--	--	474
Black ash	--	--	--	--	--	--	--	--	--	--	--
White and green ash	--	--	--	--	--	--	--	--	--	--	--
Cottonwood	--	--	--	--	--	--	--	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	--	--	--	--	--	--	--	--	--	--	--
Quaking aspen	--	--	--	--	--	--	--	--	--	--	--
Paper birch	--	--	--	--	--	--	--	--	--	--	--
Black cherry	--	--	--	--	--	--	--	--	--	--	--
Black walnut	--	--	185	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--
Total	514	--	4,478	--	--	--	933	325	--	204	928
All species	514	--	4,478	--	--	--	933	325	--	204	928

Table 53.--Timber removals from growing stock and sawtimber on commercial forest land by species group, Southeast Unit, Wisconsin, 1967 and 1982

Species group	Growing stock		Sawtimber	
	1967	1982	1967	1982
	Thousand cubic feet		Thousand board feet[1]	
Softwoods				
Jack pine	62	18	176	--
Red pine	29	156	80	15
White pine	132	106	763	488
White spruce	14	[2]	57	2
Black spruce	3	--	14	--
Balsam fir	13	1	49	3
Hemlock	64	36	368	176
Tamarack	24	1	53	4
Northern white-cedar	260	540	712	924
Other softwoods	--	--	--	--
Total	601	858	2,272	1,612
Hardwoods				
White oak	1,084	1,318	4,687	5,285
Select red oak	1,323	1,027	6,265	4,543
Other red oak	490	757	1,789	2,630
Hickory	100	73	258	192
Basswood	394	220	1,805	876
Beech	130	79	558	300
Yellow birch	6	41	45	105
Hard maple	656	497	2,905	1,639
Soft maple	953	726	4,636	3,010
Elm	2,116	562	9,844	1,979
Ash	468	663	1,618	2,245
Cottonwood	174	19	889	87
Balsam poplar	12	11	12	37
Bigtooth aspen	89	157	319	777
Quaking aspen	282	381	589	796
Paper birch	83	265	196	576
Black walnut	21	35	141	181
Other hardwoods[3]	81	393	245	999
Total	8,462	7,224	36,801	26,257
All species	9,063	8,082	39,073	27,869

[1] International 1/4-inch rule.

[2] Less than 500 cubic feet.

[3] Includes black cherry and butternut.

Table 54.--Timber removals from growing stock and sawtimber on commercial forest land by item and species category, Southeast Unit, Wisconsin, 1982

Item	Growing stock						Sawtimber					
	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods
	Thousand cubic feet						Thousand board feet[1]					
Roundwood products												
Pulpwood[2]	312	177	--	39	50	46	306	32	--	89	117	68
Saw logs	3,410	89	120	126	1,732	1,343	17,404	429	531	629	9,220	6,595
Fuelwood	2,304	[3]	2	261	858	1,183	6,284	1	7	844	2,034	3,398
Posts	469	--	211	--	39	219	762	--	210	--	84	468
Veneer logs	55	--	--	--	23	32	356	--	--	--	149	207
Poles	[3]	--	--	--	[3]	--	1	--	--	--	1	--
Other	[8]	--	--	--	[8]	--	58	--	--	--	58	--
Total	6,558	266	333	426	2,710	2,823	25,171	462	748	1,562	11,663	10,736
Logging residue	466	8	36	12	234	176	1,286	9	94	11	661	511
Other removals	1,058	6	209	100	158	585	1,412	32	267	--	134	979
All removals	8,082	280	578	538	3,102	3,584	27,869	503	1,109	1,573	12,458	12,226

[1] International 1/4-inch rule.

[2] Includes particleboard and waferboard bolts.

[3] Less than 500 cubic feet.

Table 55.--Annual mortality of growing stock on commercial forest land by softwoods and hardwoods, Southeast Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967[1/]	1982
Softwoods	400	677
Hardwoods	6,800	8,639
Total	7,200	9,316

[1/] Figures have been adjusted from those published after the 1968 survey to conform to 1982 volumes because of changes in survey procedures and volume equations.

Table 56.--Annual mortality of growing stock on commercial forest land by species group and cause, Southeast Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	14	--	--	--	--	--	--	14
Red pine	--	--	--	--	--	--	--	--
White pine	76	--	--	--	--	--	--	76
White spruce	7	--	--	--	--	7	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	11	--	--	--	--	11	--	--
Hemlock	1	--	--	--	--	--	--	1
Tamarack	213	--	9	--	--	--	--	204
Eastern redcedar	--	--	--	--	--	--	--	--
Northern white-cedar	355	--	--	--	--	136	--	219
Other softwoods	--	--	--	--	--	--	--	--
Total	677	--	9	--	--	154	--	514
Hardwoods								
White oak	117	--	1	--	--	--	1	115
Select red oak	399	--	58	--	--	6	--	335
Other red oak	282	--	56	--	--	25	--	201
Select hickory	49	--	--	--	--	--	--	49
Other hickory	--	--	--	--	--	--	--	--
Basswood	96	--	15	--	1	--	--	80
Beech	242	--	9	--	--	--	--	233
Yellow birch	73	--	--	--	--	--	--	73
Hard maple	216	--	9	--	1	--	--	206
Soft maple	219	--	1	--	--	1	1	216
Elm	4,763	--	3,485	--	--	4	8	1,266
Black ash	337	--	1	--	--	--	--	336
White & green ash	107	--	1	--	--	2	--	104
Cottonwood	6	--	3	--	--	--	--	3
Willow	78	--	9	--	--	--	--	69
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	91	--	4	--	--	--	--	87
Bigtooth aspen	252	--	24	--	--	--	--	228
Quaking aspen	892	--	253	--	--	37	14	588
Paper birch	151	--	29	--	--	73	--	49
River birch	--	--	--	--	--	--	--	--
Black cherry	162	--	27	--	--	--	2	133
Black walnut	17	--	3	--	--	--	--	14
Butternut	55	--	--	--	--	--	--	55
Other hardwoods	35	--	1	--	--	--	--	34
Total	8,639	--	3,989	--	2	148	26	4,474
All species	9,316	--	3,998	--	2	302	26	4,988

Table 57.--Annual mortality of sawtimber on commercial forest land by species group and cause, Southeast Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--
White pine	383	--	--	--	--	--	--	383
White spruce	12	--	--	--	--	12	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	3	--	--	--	--	--	--	3
Hemlock	2	--	--	--	--	--	--	2
Tamarack	192	--	6	--	--	--	--	186
Eastern redcedar	--	--	--	--	--	--	--	--
Northern white-cedar	1,075	--	--	--	2	648	--	425
Other softwoods	--	--	--	--	--	--	--	--
Total	1,667	--	6	--	2	660	--	999
Hardwoods								
White oak	428	--	9	--	--	--	5	414
Select red oak	1,233	--	141	--	--	29	--	1,063
Other red oak	763	--	124	--	--	--	--	639
Select hickory	185	--	5	--	--	--	--	180
Other hickory	--	--	--	--	--	--	--	--
Basswood	216	--	66	--	8	--	--	142
Beech	984	--	47	--	--	--	--	937
Yellow birch	184	--	--	--	--	--	--	184
Hard maple	787	--	21	--	3	--	--	763
Soft maple	681	--	4	--	--	4	--	673
Elm	17,475	--	12,929	--	--	--	--	4,546
Black ash	178	--	--	--	--	--	--	178
White & green ash	410	--	6	--	--	3	--	401
Cottonwood	17	--	11	--	--	--	--	6
Willow	189	--	3	--	--	--	--	186
Hackberry	--	--	--	--	--	--	--	--
Balsam poplar	383	--	--	--	--	--	--	383
Bigtooth aspen	646	--	80	--	--	--	--	566
Quaking aspen	1,186	--	399	--	--	93	--	694
Paper birch	243	--	72	--	--	61	--	110
River birch	--	--	--	--	--	--	--	--
Black cherry	433	--	104	--	--	--	--	329
Black walnut	41	--	11	--	--	--	--	30
Butternut	15	--	--	--	--	--	--	15
Other hardwoods	96	--	4	--	--	--	--	92
Total	26,773	--	14,036	--	11	190	5	12,531
All species	28,440	--	14,042	--	13	850	5	13,530

[1/] International 1/4-inch rule.

Table 58.--Annual mortality of growing stock and sawtimber on commercial forest land by county and softwoods and hardwoods, Southeast Unit, Wisconsin, 1982

County	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			Thousand board feet[1]		
Brown	773	--	773	2,628	--	2,628
Calumet	176	7	169	662	34	628
Columbia	748	3	745	1,621	--	1,621
Dane	319	16	303	1,012	26	986
Dodge	167	--	167	491	--	491
Door	954	142	812	2,424	399	2,025
Fond du Lac	238	4	234	741	18	723
Green	612	--	612	2,481	--	2,481
Green Lake	141	36	105	205	--	205
Jefferson	293	--	293	737	--	737
Kenosha	17	--	17	68	2	66
Kewaunee	476	56	420	1,486	102	1,384
Manitowoc	1,418	148	1,270	5,537	678	4,859
Outagamie	1,122	121	1,001	3,675	395	3,280
Ozaukee	441	98	343	1,081	--	1,081
Racine	31	--	31	61	--	61
Rock	154	--	154	300	--	300
Sheboygan	298	6	292	594	13	581
Walworth	139	--	139	207	--	207
Washington	542	40	502	1,565	--	1,565
Waukesha	128	--	128	597	--	597
Winnebago	129	--	129	267	--	267
All counties	9,316	677	8,639	28,440	1,667	26,773

[1] International 1/4-inch rule.

Table 59.--Annual mortality of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Southeast Unit, Wisconsin, 1982

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			Thousand board feet[1]		
National Forest	--	--	--	--	--	--
Miscellaneous federal	89	--	89	234	--	234
State	831	23	808	2,241	20	2,221
County and municipal	103	--	103	384	--	384
Indian	--	--	--	--	--	--
Forest industry	328	64	264	1,115	114	1,001
Farmer	4,184	175	4,009	13,387	417	12,970
Misc. private-corp.	616	45	571	1,883	94	1,789
Misc. private-indiv.	3,165	370	2,795	9,196	1,022	8,174
All owners	9,316	677	8,639	28,440	1,667	26,773

[1] International 1/4-inch rule.

Table 60.--Output of timber products by product, softwoods and hardwoods, and source of material, Southeast Unit, Wisconsin, 1981

Product	Standard units	Total		Roundwood products				Plant byproducts	
				Growing stock		Non-growing stock			
		No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet
Pulpwood[1]									
Softwoods	Standard[2]	8,150	635	2,279	177	4,224	328	1,647	130
Hardwoods	cords	12,953	1,019	1,747	135	492	38	10,714	846
Total		21,103	1,654	4,026	312	4,716	366	12,361	976
Saw logs									
Softwoods	Thousand[3]	1,344	239	1,175	209	169	30	--	--
Hardwoods	board feet	21,855	3,786	18,478	3,201	3,377	585	--	--
Total		23,199	4,025	19,653	3,410	3,546	615	--	--
Veneer logs									
Softwoods	Thousand[3]	--	--	--	--	--	--	--	--
Hardwoods	board feet	443	65	375	55	68	10	--	--
Total		443	65	375	55	68	10	--	--
Fuelwood									
Softwoods	Standard[2]	11,286	788	29	2	10,270	717	987	69
Hardwoods	cords	465,803	32,571	32,922	2,302	424,438	29,678	8,443	591
Total		477,089	33,359	32,951	2,304	434,708	30,395	9,430	660
Posts									
Softwoods	Thousand	225	231	206	211	19	20	--	--
Hardwoods	pieces	422	422	258	258	164	164	--	--
Total		647	653	464	469	183	184	--	--
Poles									
Softwoods	Pieces	--	--	--	--	--	--	--	--
Hardwoods		25	5/	25	5/	--	--	--	--
Total		25	5/	25	5/	--	--	--	--
Other[4]									
Softwoods	Thousand	97	97	--	--	--	--	97	97
Hardwoods	cubic feet	889	889	8	8	--	--	881	881
Total		986	986	8	8	--	--	978	978
All products									
Softwoods	Thousand	--	1,990	--	599	--	1,095	--	296
Hardwoods	cubic feet	--	38,752	--	5,959	--	30,475	--	2,318
Total		--	40,742	--	6,558	--	31,570	--	2,614

1/ Includes roundwood and plant byproducts used for particleboard and waferboard.

2/ 128 cubic feet; includes wood, bark, and air space.

3/ International 1/4-inch rule.

4/ Other (industrial production) includes cabin logs, charcoal wood, shingle bolts, pilings, etc.

5/ Less than 500 cubic feet.

Table 61.--Output of roundwood products by product, softwoods and hardwoods, and source of material, Southeast Unit, Wisconsin, 1981

(In thousand cubic feet)

Product and species group	All sources	Growing-stock trees			Rough and rotten trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
Industrial products							
Saw logs							
Softwoods	239	209	194	15	--	--	30
Hardwoods	3,786	3,201	2,912	289	81	335	169
Subtotal	4,025	3,410	3,106	304	81	335	199
Veneer logs and bolts							
Softwoods	--	--	--	--	--	--	--
Hardwoods	65	55	55	--	10	--	--
Subtotal	65	55	55	--	10	--	--
Pulpwood[1/]							
Softwoods	505	177	87	90	57	36	235
Hardwoods	173	135	73	62	18	8	12
Subtotal	678	312	160	152	75	44	247
Cooperage							
Softwoods	--	--	--	--	--	--	--
Hardwoods	8	8	8	--	--	--	--
Subtotal	8	8	8	--	--	--	--
Piling							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
Poles							
Softwoods	--	--	--	--	--	--	--
Hardwoods	2/	2/	2/	--	--	--	--
Subtotal	2/	2/	2/	--	--	--	--
Posts (Round and split)							
Softwoods	231	211	57	154	3	--	17
Hardwoods	422	258	108	150	82	--	82
Subtotal	653	469	165	304	85	--	99
Other							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
All industrial products							
Softwoods	975	597	338	259	60	36	282
Hardwoods	4,454	3,657	3,156	501	191	343	263
Total	5,429	4,254	3,494	760	251	379	545
Fuelwood							
Softwoods	719	2	1	1	2	124	591
Hardwoods	31,980	2,302	1,427	875	457	15,274	13,947
Total	32,699	2,304	1,428	876	459	15,398	14,538
All products							
Softwoods	1,694	599	339	260	62	160	873
Hardwoods	36,434	5,959	4,583	1,376	648	15,617	14,210
Total	38,128	6,558	4,922	1,636	710	15,777	15,083

1/ Includes particleboard and waferboard bolts.

2/ Less than 500 cubic feet.

Table 62.--Timber products from roundwood by species group and product, Southeast Unit, Wisconsin, 1981

Species group	All products	Pulpwood[1]		Saw logs		Veneer logs	
	Thousand cubic feet	Standard cords[2]	Thousand cubic feet	Thousand board feet[3]	Thousand cubic feet	Thousand board feet[3]	Thousand cubic feet
Softwoods							
Jack pine	53	331	25	--	--	--	--
Red pine	483	5,982	467	72	11	--	--
White pine	617	190	13	590	99	--	--
White spruce	1	--	--	5	[4]	--	--
Black spruce	--	--	--	--	--	--	--
Balsam fir	22	--	--	7	1	--	--
Hemlock	49	--	--	245	41	--	--
Tamarack	43	--	--	8	1	--	--
Northern white-cedar	426	--	--	417	86	--	--
Other softwoods	--	--	--	--	--	--	--
Total	1,694	6,503	505	1,344	239	--	--
Hardwoods							
White oak	5,144	267	22	4,533	788	23	3
Select red oak	4,237	318	25	3,490	609	78	12
Other red oak	3,139	235	18	2,586	451	57	9
Hickory	511	--	--	188	27	--	--
Basswood	864	--	--	1,087	190	--	--
Beech	153	13	[4]	291	49	--	--
Yellow birch	192	4	[4]	13	2	23	3
Hard maple	2,625	178	14	1,645	267	54	8
Soft maple	1,502	114	9	2,993	527	37	6
Elm	10,044	179	14	1,008	176	97	12
Ash	1,696	132	10	1,680	300	--	--
Cottonwood	263	--	--	680	114	34	6
Balsam poplar	39	--	--	98	16	--	--
Bigtooth aspen	432	179	14	244	42	--	--
Quaking aspen	882	364	28	498	87	--	--
Paper birch	996	208	16	235	41	6	1
Black walnut	53	--	--	219	35	34	5
Other hardwoods[5]	3,662	48	3	367	65	--	--
Total	36,434	2,239	173	21,855	3,786	443	65
All species	38,128	8,742	678	23,199	4,025	443	65

(Table 62 continued on next page)

[1] Includes particleboard and waferboard bolts.

[2] 128 cubic feet; includes wood, bark, and air space.

[3] International 1/4-inch rule.

[4] Less than 500 cubic feet.

[5] Includes butternut and black cherry.

(Table 62 continued)

Species group	Fuelwood		Posts		Poles		Other products
	Standard cords [2]	Thousand cubic feet	Thousand pieces	Thousand cubic feet	Pieces	Thousand cubic feet	Thousand cubic feet
Softwoods							
Jack pine	422	28	--	--	--	--	--
Red pine	83	5	--	--	--	--	--
White pine	7,201	505	--	--	--	--	--
White spruce	11	1	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--
Balsam fir	310	21	--	--	--	--	--
Hemlock	106	8	--	--	--	--	--
Tamarack	601	42	--	--	--	--	--
Northern white-cedar	1,565	109	225	231	--	--	--
Other softwoods	--	--	--	--	--	--	--
Total	10,299	719	225	231	--	--	--
Hardwoods							
White oak	60,941	4,265	58	58	--	--	8
Select red oak	51,328	3,588	3	3	14	[4]	--
Other red oak	38,027	2,658	3	3	11	[4]	--
Hickory	6,928	484	--	--	--	--	--
Basswood	9,655	674	--	--	--	--	--
Beech	1,476	104	--	--	--	--	--
Yellow birch	2,703	187	--	--	--	--	--
Hard maple	33,456	2,336	--	--	--	--	--
Soft maple	13,796	960	--	--	--	--	--
Elm	140,624	9,842	--	--	--	--	--
Ash	19,843	1,386	--	--	--	--	--
Cottonwood	2,067	143	--	--	--	--	--
Balsam poplar	308	23	--	--	--	--	--
Bigtooth aspen	5,369	376	--	--	--	--	--
Quaking aspen	10,962	767	--	--	--	--	--
Paper birch	13,413	938	--	--	--	--	--
Black walnut	191	13	--	--	--	--	--
Other hardwoods [5]	46,273	3,236	358	358	--	--	--
Total	457,360	31,980	422	422	25	[4]	8
All species	467,659	32,699	647	653	25	[4]	8

[2] 128 cubic feet; includes wood, bark, and air space.

[4] Less than 500 cubic feet.

[5] Includes butternut and black cherry.

Table 63.--Volume of primary plant residue by use and type of residue, Southeast Unit, Wisconsin, 1981

(In thousand cubic feet)

Use	Wood residue							
	Total		Coarse [1]		Fine [2]		Bark [3]	
	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods
Fiber products [4]	84.6	619.0	84.6	619.0	--	--	--	--
Charcoal	--	--	--	--	--	--	--	--
Industrial fuel	29.6	223.7	27.5	108.6	2.1	115.1	62.2	326.4
Domestic fuel	39.5	367.3	39.4	367.0	0.1	0.3	18.7	208.3
Miscellaneous [5]	97.2	881.2	8.5	199.1	88.7	682.1	13.8	290.3
Not used [6]	2.9	32.1	0.3	16.0	2.6	16.1	2.6	38.6
Total	253.8	2,123.3	160.3	1,309.7	93.5	813.6	97.3	863.6

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark disposal at pulpmills.

[4] For manufacture of pulp, hardboard, or roofing felt.

[5] Livestock bedding, mulch, small dimension, and specialty items.

[6] Includes residue burned as waste.

Table 64.--All live tree biomass on commercial forest land by species group and forest type, Southeast Unit, Wisconsin, 1983

(In green tons)

Species group	All types	Forest type							
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar	Tamarack
Softwoods									
Jack pine	146,980	76,773	--	--	--	--	--	--	--
Red pine	933,541	24,273	754,224	137,634	--	11,150	--	--	--
White pine	813,884	9,376	--	465,443	--	--	49,825	41,742	10,473
White spruce	158,871	--	--	6,643	--	82,174	--	23,561	--
Black spruce	78,810	--	--	--	--	--	52,422	26,388	--
Balsam fir	226,519	--	--	--	--	--	--	158,212	--
Hemlock	152,990	--	--	--	--	--	--	22,875	--
Tamarack	512,922	--	--	--	--	--	--	192,648	189,722
Eastern redcedar	166,393	--	13,269	--	--	--	--	--	--
Northern white-cedar	2,872,254	--	--	--	--	--	--	1,976,446	--
Other softwoods	14,226	--	--	14,226	--	--	--	--	--
Total	6,077,390	110,422	767,493	623,946	--	93,324	102,247	2,441,872	200,195
Hardwoods									
White oak	8,732,065	--	26,288	--	--	--	--	10,695	--
Select red oak	5,325,897	--	--	--	--	--	--	--	--
Other red oak	4,122,667	--	58,800	--	--	--	--	--	--
Select hickory	2,592,184	--	--	--	--	--	--	11,500	--
Other hickory	604,443	--	--	--	--	--	--	8,613	--
Basswood	1,794,940	--	--	--	--	--	--	54,693	--
Beech	978,463	--	--	--	--	--	--	--	--
Yellow birch	603,828	--	--	--	--	--	--	98,760	--
Hard maple	4,758,212	--	--	--	--	--	--	12,867	--
Soft maple	3,472,302	14,721	--	--	--	26,383	--	43,945	--
Elm	3,372,270	--	--	25,047	--	--	--	75,441	32,858
Black ash	2,390,047	--	--	--	--	--	--	119,516	22,574
White & green ash	4,232,979	--	--	--	--	13,758	--	13,737	--
Cottonwood	269,482	--	--	--	--	--	--	--	--
Willow	1,032,395	--	--	--	--	--	--	21,581	--
Hackberry	42,406	--	--	--	--	--	--	--	--
Balsam poplar	165,614	--	--	--	--	--	--	--	--
Bigtooth aspen	939,714	--	--	10,570	--	--	--	--	--
Quaking aspen	2,742,731	--	1,842	--	--	--	14,209	245,171	--
Paper birch	1,359,113	--	--	--	--	--	--	218,136	16,980
River birch	--	--	--	--	--	--	--	--	--
Black cherry	3,066,733	--	4,836	14,639	--	--	--	--	--
Black walnut	371,566	--	--	3,619	--	--	--	--	--
Butternut	163,122	--	--	--	--	--	--	--	--
Other hardwoods	1,367,443	--	--	--	--	--	--	--	--
Noncommercial species	1,531,029	--	--	5,188	--	--	--	6,283	--
Total	56,031,645	14,721	91,766	59,063	--	40,141	14,209	940,938	72,412
All species	62,109,035	125,143	859,259	683,009	--	133,465	116,456	3,382,810	272,607

(Table 64 continued on next page)

(Table 64 continued)

Species group	Forest type						
	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotics	Nonstocked
Softwoods							
Jack pine	70,207	--	--	--	--	--	--
Red pine	6,260	--	--	--	--	--	--
White pine	39,837	7,556	163,388	22,146	--	--	4,098
White spruce	14,516	31,977	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--
Balsam fir	--	14,236	23,418	30,653	--	--	--
Hemlock	--	87,349	28,637	14,129	--	--	--
Tamarack	--	82,226	--	18,430	29,896	--	--
Eastern redcedar	68,214	84,910	--	--	--	--	--
Northern white-cedar	--	517,389	281,491	64,419	32,509	--	--
Other softwoods	--	--	--	--	--	--	--
Total	199,034	825,643	496,934	149,777	62,405	--	4,098
Hardwoods							
White oak	7,579,197	196,402	793,616	125,867	--	--	--
Select red oak	4,248,962	89,090	934,446	53,399	--	--	--
Other red oak	3,736,567	19,898	98,260	209,142	--	--	--
Select hickory	1,929,200	--	588,561	62,923	--	--	--
Other hickory	413,077	--	182,753	--	--	--	--
Basswood	394,061	106,689	1,219,612	--	19,885	--	--
Beech	--	11,429	967,034	--	--	--	--
Yellow birch	--	297,661	207,407	--	--	--	--
Hard maple	305,288	67,802	4,326,215	46,040	--	--	--
Soft maple	201,154	2,054,197	1,054,004	77,898	--	--	--
Elm	452,730	1,101,864	1,572,177	58,988	40,060	--	13,105
Black ash	49,657	1,837,626	316,510	44,164	--	--	--
White & green ash	338,511	1,804,973	1,976,572	66,018	19,410	--	--
Cottonwood	86,206	167,146	--	16,130	--	--	--
Willow	42,993	788,611	149,730	29,480	--	--	--
Hackberry	42,406	--	--	--	--	--	--
Balsam poplar	--	66,390	58,268	40,956	--	--	--
Bigtooth aspen	406,617	62,199	361,469	98,859	--	--	--
Quaking aspen	320,173	427,496	221,144	1,506,029	6,667	--	--
Paper birch	125,088	350,359	328,102	164,225	156,223	--	--
River birch	--	--	--	--	--	--	--
Black cherry	1,709,674	6,865	1,084,367	246,352	--	--	--
Black walnut	329,666	--	38,281	--	--	--	--
Butternut	22,725	20,234	120,163	--	--	--	--
Other hardwoods	237,704	540,225	582,212	7,302	--	--	--
Noncommercial species	384,182	174,903	853,562	59,438	16,625	--	30,848
Total	23,355,838	10,192,059	18,034,465	2,913,210	258,870	--	43,953
All species	23,554,872	11,017,702	18,531,399	3,062,987	321,275	--	48,051

Table 65.--All live tree biomass by species group and tree biomass component, Southeast Unit, Wisconsin, 1983

(In green tons)

Species group	All components	Biomass component: All live 1- to 5-inch trees	Growing stock: Boles	Growing stock: Tops and limbs	Cull: Boles	Cull: Tops and limbs
Softwoods						
Jack pine	146,980	26,789	84,380	35,811	--	--
Red pine	933,541	151,472	534,429	229,690	12,570	5,380
White pine	813,884	217,539	406,148	172,166	12,694	5,337
White spruce	158,871	18,899	99,088	40,884	--	--
Black spruce	78,810	54,454	17,243	7,113	--	--
Balsam fir	226,519	145,922	57,071	23,526	--	--
Hemlock	152,990	6,287	86,896	35,576	17,184	7,047
Tamarack	512,922	100,401	282,464	119,477	7,438	3,142
Eastern redcedar	166,393	78,360	40,186	16,323	27,931	3,593
Northern white-cedar	2,872,254	548,515	1,434,066	584,036	224,478	81,159
Other softwoods	14,226	--	10,069	4,157	--	--
Total	6,077,390	1,348,638	3,052,040	1,268,759	302,295	105,658
Hardwoods						
White oak	8,732,065	104,036	4,451,147	1,863,064	1,637,102	676,716
Select red oak	5,325,897	205,939	2,995,071	1,276,898	594,813	253,176
Other red oak	4,122,667	66,436	2,002,377	845,953	853,719	354,182
Select hickory	2,592,184	182,087	1,384,730	585,326	309,382	130,659
Other hickory	604,443	80,177	334,431	141,970	33,640	14,225
Basswood	1,794,940	247,435	786,727	334,850	301,235	124,693
Beech	978,463	67,407	421,411	178,518	218,525	92,602
Yellow birch	603,828	35,973	272,815	112,474	128,583	53,983
Hard maple	4,758,212	330,580	2,469,288	1,051,153	635,509	271,682
Soft maple	3,472,302	288,859	1,670,934	714,957	563,900	233,652
Elm	3,372,270	510,504	1,572,362	651,377	464,529	173,498
Black ash	2,390,047	255,539	1,360,732	568,857	156,663	48,256
White & green ash	4,232,979	441,036	2,282,200	971,784	380,240	157,719
Cottonwood	269,482	--	150,418	63,635	39,216	16,213
Willow	1,032,395	12,508	423,065	178,638	296,461	121,723
Hackberry	42,406	463	29,485	12,458	--	--
Balsam poplar	165,614	12,274	86,398	37,609	20,393	8,940
Bigtooth aspen	939,714	13,020	538,627	234,507	107,093	46,467
Quaking aspen	2,742,731	453,234	1,310,173	562,970	300,680	115,674
Paper birch	1,359,113	230,011	729,070	309,198	64,159	26,675
River birch	--	--	--	--	--	--
Black cherry	3,066,733	335,842	1,333,686	569,045	596,933	231,227
Black walnut	371,566	5,757	213,680	91,034	42,815	18,280
Butternut	163,122	5,667	91,943	39,039	18,578	7,895
Other hardwoods	1,367,443	215,620	334,595	145,675	493,408	178,145
Noncommercial species	1,531,029	--	--	--	1,306,349	224,680
Total	56,031,645	4,100,404	27,245,365	11,540,989	9,563,925	3,580,962
All species	62,109,035	5,449,042	30,297,405	12,809,748	9,866,220	3,686,620

Table 66.--Sampling errors[1/] for estimates smaller than the Unit totals of volume, net growth, removals, and area of commercial forest land, Southeast Unit, Wisconsin, 1983

Sampling error	Commercial forest land	Growing stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	- - - -Thousand cubic feet- - - -			- - - -Thousand board feet[2/] - - -		
1	158.2	30,598,243	1,947,056	11,310,044	120,623,215	7,840,265	57,077,035
2	39.5	7,649,561	486,764	2,827,511	30,155,804	1,960,066	14,269,259
3	17.6	3,399,805	216,340	1,256,672	13,402,579	871,141	6,341,893
4	9.9	1,912,390	121,691	706,878	7,538,951	490,017	3,567,315
5	6.3	1,223,930	77,882	452,402	4,824,929	313,611	2,283,081
10	1.6	305,982	19,471	113,100	1,206,232	78,403	570,770
15	0.7	135,992	8,654	50,267	536,103	34,846	253,676
20	0.4	76,496	4,868	28,275	301,558	19,601	142,693
25	0.3	48,957	3,115	18,096	192,997	12,544	91,323
50	0.1	12,239	779	4,524	48,249	3,136	22,831
100	--	3,060	195	1,131	12,062	784	5,708

[1/] At the 68-percent probability level.

[2/] International 1/4-inch rule.

Table 67.--Sampling errors for county totals of growing-stock volume, net growth, removals, and area of commercial forest land, Southeast Unit, Wisconsin, 1983

(Percent of estimate)

County	Commercial forest land	Growing stock		
		Inventory	Growth	Removals
Brown	1.83	23.41	35.32	87.45
Calumet	2.54	42.15	56.14	1/
Columbia	1.37	19.08	25.07	98.63
Dane	1.32	19.61	32.43	126.79
Dodge	2.39	40.51	61.46	388.62
Door	1.22	15.97	23.97	117.00
Fond du Lac	2.16	28.28	43.12	251.37
Green	2.26	32.03	56.51	142.39
Green Lake	2.74	38.51	51.96	303.25
Jefferson	2.34	27.77	36.73	290.35
Kenosha	3.83	64.81	97.19	492.22
Kewaunee	2.07	25.73	42.22	167.36
Manitowoc	1.67	22.90	47.21	243.59
Milwaukee	1/	1/	1/	1/
Outagamie	1.49	21.48	35.86	104.55
Ozaukee	3.12	40.76	272.48	1/
Racine	3.06	66.27	105.09	1/
Rock	2.43	40.41	50.47	1/
Sheboygan	1.74	26.70	37.94	250.61
Walworth	2.10	30.41	60.12	408.04
Washington	1.85	30.02	52.43	1/
Waukesha	2.22	36.41	70.03	534.20
Winnebago	3.34	34.40	43.96	183.96
All counties	0.42	5.88	9.10	38.74

[1/] There were no data in these cells.

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The fourth inventory of Wisconsin's timber resource shows that commercial forest area in the Southeast Survey Unit increased from 904 to 909 thousand acres between 1968 and 1983. During the same period growing-stock volume increased 37 percent. Highlights and statistics are presented on area, volume, growth, mortality, and removals.

KEY WORDS: Area, volume, growth, mortality, removals.

United States Department of Agriculture

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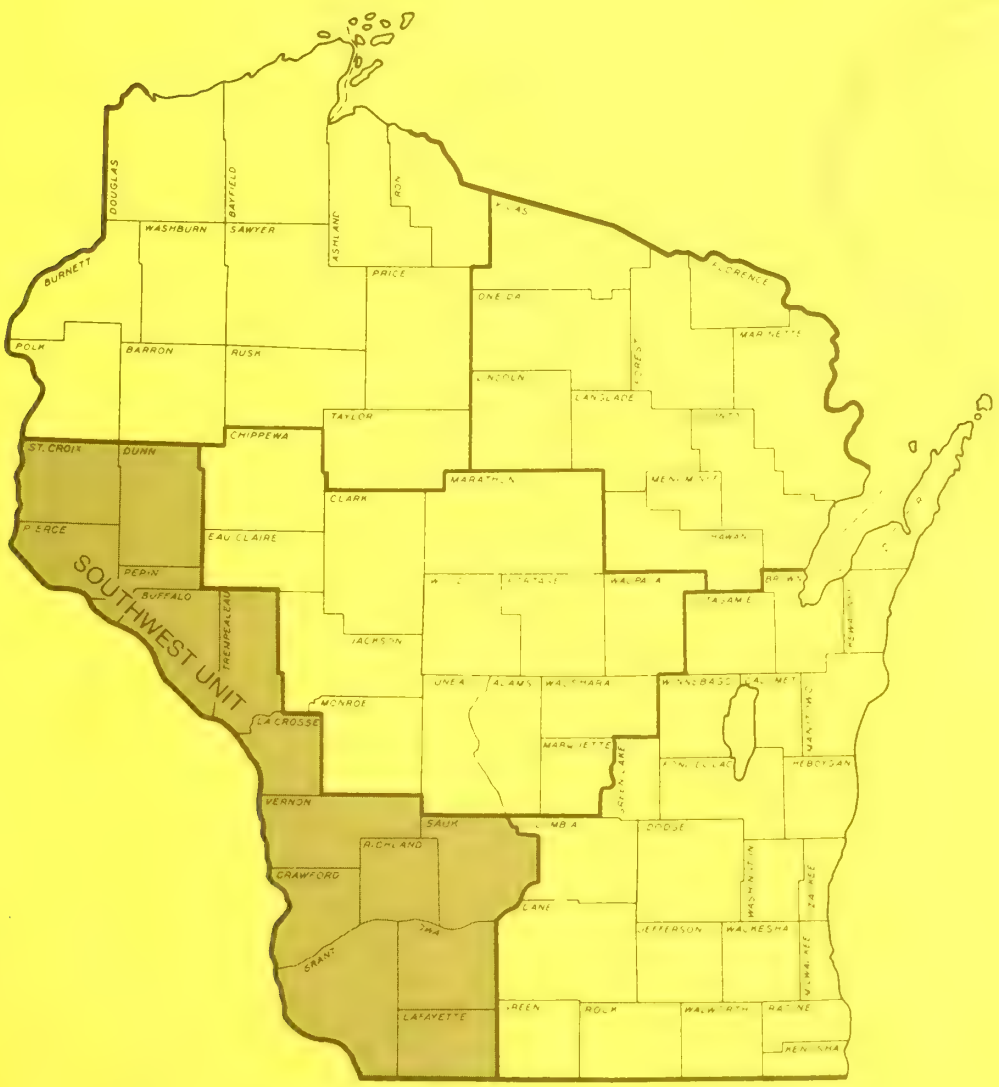
Timber Resource of Wisconsin's Southwest Survey Unit, 1983

Gerhard K. Raile



Information contained in this report includes the most commonly used Forest Inventory and Analysis statistics. However, additional forest resource data can be provided to interested users. Persons requesting additional information that can be provided from the raw inventory data are expected to pay for the retrieval costs. These costs will vary depending on the complexity of the request, from less than $100 for a relatively simple request to $2,000 for a complex retrieval involving the services of a Forest Inventory and Analysis computer programmer. If requests for data conflict with ongoing Forest Inventory and Analysis work, they will be scheduled so as to minimize the impact on the work unit.

Requests for unpublished information may be directed to:

Burton L. Essex
Forest Inventory and Analysis Project
North Central Forest Experiment Station
1992 Folwell Avenue
St. Paul, Minnesota 55108
Phone: (612) 642-5275

Area served: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin.

North Central Forest Experiment Station
Forest Service--U.S. Department of Agriculture
1992 Folwell Avenue
St. Paul, Minnesota 55108
Manuscript approved for publication March 11, 1985
1985

FOREWORD

Forest Inventory and Analysis (FIA) is a continuing endeavor as mandated by the Renewable Forest and Rangeland Resources Planning Act of 1974. Prior inventories were mandated by the McSweeney-McNary Forest Research Act of 1928. The objective of FIA is to periodically inventory the Nation's forest land to determine its extent, condition, and volume of timber, growth, and depletions. Up-to-date resource information is essential to frame intelligent forest policies and programs. USDA Forest Service regional experiment stations are responsible for conducting these inventories and publishing summary reports for individual States. The North Central Forest Experiment Station is responsible for forest resource evaluation in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin.

Fieldwork for the Wisconsin Statewide forest inventory was begun in the summer of 1981 and completed in late 1983. Reports on the three previous inventories of Wisconsin's timber resource are dated 1936, 1956, and 1968.

More accurate survey information was obtained during the 1983 survey than otherwise would have been feasible because of intensified field sampling. Such sampling was made possible by additional funding and field personnel provided the North Central Station by the Wisconsin State Legislature through the Department of Natural Resources. Data from the Department's canvass of all primary wood-using plants in the State were used to help estimate the quantity of timber products harvested in Wisconsin.

Aerial photos used in the Southwest Unit Forest Inventory were furnished by the Wisconsin Department of Natural Resources and the USDA Agricultural Stabilization and Conservation Service.

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TIMBER RESOURCE OF WISCONSIN'S SOUTHWEST SURVEY UNIT, 1983

Gerhard K. Raile, *Mensurationist*

HIGHLIGHTS

Forest Area

- Forest land accounted for 2.0 million acres (32 percent of the Unit's land area) in 1983; this constitutes a 30-percent increase since 1968.
- Commercial forest land occupied 1.9 million acres in 1983--an increase of 29 percent from the 1.5 million acres in 1968.
- Productive-reserved forest land totaled 38,800 acres in 1983, compared to 12,300 acres in 1968.
- Vernon County contained the largest area of commercial forest in 1983 (200,300 acres), a 44-percent increase from 139,300 acres in 1968. Land changing from wooded pasture to commercial forest caused this increase.
- Farmers and miscellaneous private individuals hold 91 percent of the commercial forest.
- State and Federal agencies owned 3 percent of commercial forest in 1983.
- The oak-hickory forest type continued to dominate the commercial forest land base in 1983, comprising 55 percent of the commercial forest area.
- Sapling and seedling stands, which increased 152,300 acres between surveys, occupied 20 percent of the commercial forest in 1983 as compared to 16 percent in 1968.
- Sawtimber stands, which increased by 271,100 acres between surveys, amounted to 56 percent of the commercial forest in 1983, compared to 54 percent in 1968.
- Sixty-two percent (34,800 acres) of the commercial plantation area is in the red pine type.
- Only 6 percent of all commercial forest area has a prominent conifer understory.
- Less than 2 percent of all forest land is reserved.
- The average site index for commercial forest land in the Unit is 66 feet at age 50.

Timber Volume

- The volume of growing stock in 1983 was 1.9 billion cubic feet, 56 percent greater than the 1.2 billion in 1968.
- Sawtimber volume amounted to 6.0 billion board feet in 1983, 77 percent greater than the 1968 volume.
- The 1.8 billion cubic feet of hardwoods make up 95 percent of the growing-stock volume.
- Red pine growing-stock volume increased 812 percent since 1968. Ingrowth of plantations to merchantable size was the dominant factor in this dramatic increase.
- Sixty-two percent of the growing-stock volume is accounted for by the oaks (857 million cubic feet), maples (208 million cubic feet), and basswood (125 million cubic feet).
- Average growing-stock volume per acre in 1983 was 1,008 cubic feet, compared to 831 cubic feet in 1968.
- Nearly 60 percent of the sawtimber volume is in trees with grade 3 butt logs. Tree diameter is generally the limiting criteria.
- The volume in cull trees (rough, rotten, and short-log cull) is 508 million cubic feet; salvable dead tree volume is 35 million cubic feet.

Stand Conditions

- Net annual growth on growing-stock trees was 50 million cubic feet in 1982.
- The net annual growth rate of growing stock was 2.6 percent of inventory in 1982.
- Net growth averaged 26.2 cubic feet per acre in 1982.
- Annual mortality of growing stock amounted to 17 million cubic feet (0.9 percent of inventory) in 1982.
- Disease accounted for 34 percent of the mortality in 1982; chiefly diseases of elm.

Timber Use

- Timber removals from growing stock in 1981 totaled nearly 30.6 million cubic feet (1.6 percent of inventory), compared to 29.9 million cubic feet (2.4 percent of inventory) in 1967.
- The oaks made up 64 percent of the 1981 removals volume and account for 44 percent of the growing-stock volume.
- Output of roundwood products totaled 49.9 million cubic feet in 1981; 51 percent was fuelwood, 39 percent was saw logs, 4 percent was pulpwood, and 6

percent was other.
- Wood residue from primary plants totaled 9.2 million cubic feet in 1981, 99 percent of which was used.

Biomass

- Highest yields per acre of live tree biomass are in the oak-hickory (84 green tons) the red pine (79 tons), and the birch (75 tons) forest types.
- Live tree biomass totaled 143 million green tons (74 tons per acre) in 1983, with just under half in the boles of growing-stock trees.

APPENDIX

ACCURACY OF SURVEY

Forest Inventory and Analysis information is based on a sampling procedure designed to provide reliable statistics at the State and Unit levels. Consequently, the reported figures are estimates only. A measure of reliability of these figures is given by sampling errors. These sampling errors mean that the chances are two out of three that the true inventory value is within the limits indicated. For example, the estimated growing-stock volume in the Southwest Unit in 1983, 1,935.7 million cubic feet, has a sampling error of ± 3.7 percent (71.6 million cubic feet). Therefore, the growing-stock volume from a 100-percent inventory would have a two in three chance of falling between 1,864.1 and 2,007.3 million cubic feet.

The following tabulation shows the sampling errors for the 1983 Southwest Unit Forest Inventory:

Item	Unit totals	Sampling error
Growing stock	(Million cubic feet)	(Percent)
Volume	1,936	3.7
Growth	50	5.7
Removals	31	39.4
Sawtimber	(Million board feet[1])	
Volume	6,039	4.2
Growth	183	5.3
Removals	124	30.4
Commercial forest land	(Thousand acres) 1,920.0	0.39

As survey data are broken down into sections smaller than Survey Unit totals, the sampling error increases. For example, the sampling error for growing-stock volume in a particular county is higher than that for total growing-stock volume in the Unit (table 66 shows the sampling errors for estimates smaller than Unit totals).

SURVEY PROCEDURES

We used a two-phase sampling design for the 1983 Wisconsin survey. This sampling scheme and associated estimators are similar to sampling with partial replacement (SPR) in that a set of randomly located plots was available for remeasurement and a set of new randomly located plots was established and measured. Major enhancements in the new Wisconsin design were stratification for disturbance on the old sample and use of a growth model to improve regression estimates made on the old undisturbed forest plots. The growth model used was the Stand and Tree Evaluation and Modeling System (STEMS).[2]

The major steps in the new survey design were as follows:

1. The first phase of the survey was to interpret aerial photos. In this phase two sets of random points were located on current aerial photographs. The first was a set of new photo points and the second was a set of relocated old photo points (ground plot locations from the previous inventory). In all, 35,628 1-acre points, including old ground sample locations, were systematically distributed across aerial photos of the entire Unit. These points were classified into land classes as shown below to make a preliminary estimate of forest area. Next, 12,802 of these points were stereoclassified as to stand-size class and density. Finally, 2,455 points were examined on the ground to correct the preliminary area estimate for errors in classification and for actual changes in land use since the photos were taken.

Land class	Photo points classified	Photo points stereo-classified	Inventory plots checked
Forest land	11,675	11,675	722
Unproductive/reserved forest land	216	216	26
Nonforest land	22,974	911	1,656
Water	763	0	51
Total	35,628	12,802	2,455

[1] *International ¼-inch rule.*

[2] *For more information on STEMS, see: Belcher, D. L.; Holdaway, M. R.; Brand, G. J. A description of STEMS: The stand and tree evaluation and modeling system. Gen. Tech. Rep. NC-79. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1981, 18 p.*

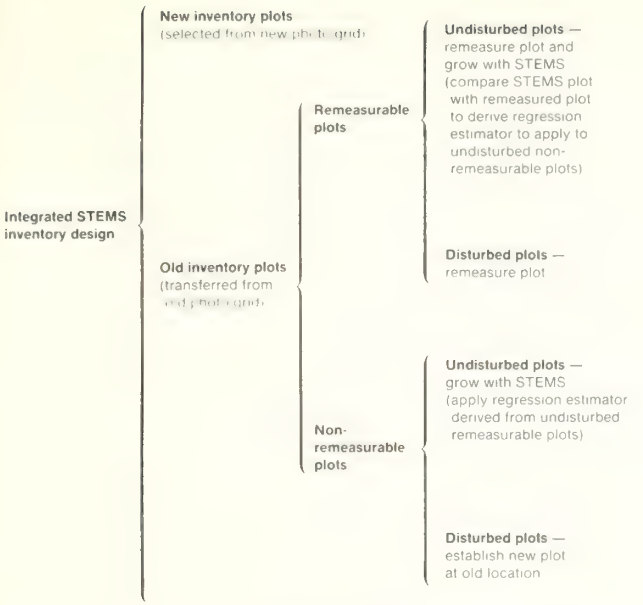
Integrated STEMS inventory design
New inventory plots
(selected from new photo grid)
Remeasurable plots
Undisturbed plots — remeasure plot and grow with STEMS (compare STEMS plot with remeasured plot to derive regression estimator to apply to undisturbed non-remeasurable plots)
Disturbed plots — remeasure plot
Old inventory plots
(transferred from old photo grid)
Non-remeasurable plots
Undisturbed plots — grow with STEMS (apply regression estimator derived from undisturbed remeasurable plots)
Disturbed plots — establish new plot at old location

Figure 1.--*Logic structure for the 1983 Wisconsin sample design.*

2. The second phase of the survey was to sample ground plots. The plot selection and measurement procedures of phase two of the new Wisconsin survey design are outlined in figure 1.

From the new photo points, a random sample of ground plots was established; and land use, volume, mortality, and cutting were recorded. At each forest ground plot location, variable-radius plots (basal area factor 37.5) were established at 10 points uniformly placed over the sample acre. These locations were monumented for future remeasurement.

On the old inventory photo points (old plot locations), we used a somewhat different procedure. Old plots were either remeasurable (monumented) or nonremeasurable (not monumented and thus difficult to relocate). Within both of these groups, old plots were additionally identified as undisturbed or disturbed. The remeasurable old inventory photo points which are classified as forest undisturbed were remeasured on the ground to obtain current land use, volume, growth, and removals data. Additionally, all forest undisturbed remeasurable plots were projected to the current time using STEMS to provide estimates of current volume and growth. The comparison of the projected and observed values on these plots provided regression estimators to adjust the projected values of the undisturbed nonremeasurable plots. All disturbed remeasurable plots were remeasured on the ground to assess changes since the last inventory.

Disturbance as used here refers to any change on a plot that can be detected on aerial photos and that the STEMS growth processor cannot predict, such as catastrophic mortality, cutting, seedling stands, and land use change.

The nonremeasurable forest points are those that were measured but not monumented during the 1968 inventory. STEMS updated these old undisturbed plots, producing an estimate of current data. Thus these points became ground plots even though the information was obtained without actually visiting the plot. For points classified as disturbed, a new ground plot was established as close to the old location as possible. This allowed information about land use trends to be recorded even though the old plot could not be exactly relocated for remeasurement.

The estimation procedure for computing statistics from this sampling design was more complicated than the simple two-phase estimation procedure used in the past. In fact, this procedure yielded two independent samples, one coming from the new photo points and the other coming from the old photo points that were remeasured or projected. A more detailed description of the sampling design is available in a separate publication.[3]

3. Statistics on timber utilization during 1981 were obtained from mill surveys. The Wisconsin Department of Natural Resources canvassed resident sawmills, veneer mills, and other primary wood-using plants. The North Central Forest Experiment Station canvassed out-of-State sawmills, pulpmills, and veneer mills to determine their use of Wisconsin timber. Fuelwood and fencepost output was based on a sample of public and private landowners to determine their production of fuelwood and fenceposts. Estimates of primary mill residue used for fuelwood were obtained from the canvass of Wisconsin primary wood-using plants.

4. We measured a total of 2,568 felled trees on 133 active logging operations throughout the State during 1981-1982 to develop wood utilization factors for converting timber products output to timber removals for saw logs and pulpwood. Factors for all other products were obtained during the 1966-1967 Wisconsin utilization study.

5. Field data were sent to St. Paul, Minnesota, to be processed and analyzed.

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[3]*Hahn, J. T.; Hansen, M. H.; Fairweather, S. E. A Sampling procedure incorporating a growth simulator. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; (Manuscript in process).*

COMPARING WISCONSIN'S FOURTH INVENTORY WITH THE THIRD INVENTORY

Data from new forest inventories are often compared with data from earlier inventories to determine trends in forest resources. However, changes in procedures and definitions between surveys often make it necessary to adjust earlier survey data so that they are comparable to data from the new survey. A consistency check was made for the Unit to ensure that the changes observed between inventories reflect actual changes in the resource and not changes in definitions or procedures.

Between the 1968 and 1983 inventories of Southwest Wisconsin, a procedural change was made in the method of deriving annual growth and mortality estimates. Growth and mortality figures for the 1968 inventory were based on field estimates from nonremeasurement plots. Information gathered on remeasurement plots during the current inventory was used to adjust the STEMS estimate of growth and mortality.

Checking for Consistency

A test was made to ensure that it was possible to move from the 1968 resource statistics to the 1983 values by means of Timber Resource Analysis System (TRAS), a USDA Forest Service computer program for updating, backdating, and projecting timber volume, growth, mortality, and removals. Using growth rates, mortality rates, and removals rates for the period between the two surveys, TRAS projected the inventory from 1968 to 1983. The program prints out volumes by diameter class for softwoods and hardwoods for selected years in the period. Thus, any inconsistencies in volume, growth, mortality, and removals could be identified. No adjustment of the 1968 inventory was needed.

TRAS generates an estimate of what total removals had to be for the inventory to have changed as it did between surveys, given the volume, growth, and mortality data. Estimates of removals for products and for logging residues, two of the three components of total timber removals, were available from an independent utilization study. An estimate of "other" removals (see Definition of Terms in Appendix), the third component of total removals, was made by subtracting the first two removals components from the TRAS-generated total removals estimate. This estimate of "other" removals was compared with findings from remeasurement plots and new plots (stump counts and land use change) to check its validity. Total removals were average annual removals because the estimate of "other" removals was based on a removals trend line from 1968 to 1983.

Log Grade

In Wisconsin's Southwest Unit the butt log of every sawtimber tree on every full permanent sample plot was graded for quality.

Butt logs were graded on the basis of external characteristics as indicators of quality. Hardwood species were graded according to "Hardwood Log Grades for Standard Lumber."[4] The best 12-foot section of the lowest 16-foot hardwood log, or the best 12-foot upper section if the butt log did not meet minimum log-grade standards, was graded as follows:

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[4] *Vaughn, C. L.; Wollin, C. A.; McDonald, K. A.; Bulgrin, E. H. Hardwood log grades for standard lumber. Res. Pap. FPL-63. Madison, WI: U.S. Department of Agriculture, Forest Service, Forest Products Laboratory; 1966. 52 p.*

Forest Service standard grades for hardwood factory saw logs

Grading factors		Specifications							
		Log grade 1			Log grade 2				Log grade 3
Position in tree		Butts only	Butts and uppers		Butts and uppers				Butts and uppers
Scaling diameter, inches		[1]13-15	16-19	20+	[2]11+		12+		8+
Length without trim, feet			10+		10+	8-9	10-11	12+	8+
Required clear cuttings[3] of each of three best faces[4]	Min. length, feet	7	5	3	3	3	3	3	2
	Max. number	2	2	2	2	2	2	3	No Limit
	Min. proportion of log length required in clear cutting	5/6	5/6	5/6	2/3	3/4	2/3	2/3	1/2
Maximum sweep and crook allowance	For logs with less than one-fourth of end in sound defects		15 percent			30 percent			50 percent
	For logs with more than one-fourth of end in sound defects		10 percent			20 percent			35 percent
Maximum scaling deduction			40 percent[5]			50 percent[6]			50 percent

[1]Ash and basswood butts can be 12 inches if they otherwise meet requirements for small #1's.
[2]Ten-inch logs of all species can be #2 if they otherwise meet requirements for small #1's.
[3]A clear cutting is a portion of a face, extending the width of the face, that is free of defects.
[4]A face is one-fourth of the surface of the log as divided lengthwise.
[5]Otherwise #1 logs with 41-60 percent deductions can be #2.
[6]Otherwise #2 logs with 51-60 percent deductions can be #3.

Forest Service standard specifications for hardwood construction logs (tie and timber logs)[1]

Position in tree		Butt and upper
Min. diameter, small end		8 inches +
Min. length, without trim		8 feet
Clear cuttings		No requirements.
Sweep allowance, absolute		One-fourth of the diameter at the small end for each 8 feet of length.
Sound surface defects	Single knots	Any number, if no one knot has an average diameter above the callus in excess of one-third of the log diameter at point of occurrence.
	Whorled knots	Any number if sum of knot diameters above the callus does not exceed one-third of the log diameter at point of occurrence.
	Holes	Any number provided none has a diameter over one-third of the log diameter at point of occurrence, and none extends more than 3 inches into included timber.[2]
Unsound surface defects		Same requirements as for sound defects if they extend into included timber.[2] No limit if they do not.
End defects	Sound	No requirements.
	Unsound	None allowed; log must be sound internally, but will admit one shake not to exceed one-fourth the scaling diameter and will admit a longitudinal split not extending more than 5 inches into the contained timber.

[1]These specifications are minimum for the class. If, from a group of logs, factory logs are selected first, thus leaving only nonfactory logs from which to select construction logs, then the quality range of the construction logs so selected is limited, and the class may be considered a grade. If selection for construction logs is given first priority, it may be necessary to subdivide the class into grades.

[2]Included timber is always square, and dimension is judged from small end.

Softwood species were graded according to the following specifications on the following page.

Log Grades for Eastern White Pine

Log grade	Minimum size Diameter	Minimum size Length[1]	Sweep or crook allowance	Total cull allowance including sweep	Maximum weevil injury	Allowable knot size (inches)[2] on three best faces or minimum clearness of four faces
	Inches	*Feet*	--------*Percent*--------		*Number*	*Inches*
1	12 & 13	8-16	20	50	0	Four faces clear full length
	14+	10-16	20	50	0	Two faces clear full length, or four faces clear 50 percent length (6 feet min. length)[3]
2	6+	8-16	30	50	0	Sound knots l.e.[4] D/6 and less than 3 inches[5] Unsound knots: l.e. 1½ inches and for: butt, lots l.e. D/12 upper logs l.e. D/10 or four faces clear 50 percent of length
3	6+	8-16	40	50	8-foot logs 1 weevil 10-foot+ logs: 2 weevil	Sound knots l.e. D/3 and less than 5 inches. Unsound knots l.e.D/6 and less than 2½ inches.
4	6+	8-16	50	50	No limit	No limit

[1]Plus trim.
[2]Disregard all knots less than ½-inch diameter in all grades.
[3]The sum of the diameter of sound knots plus twice the sum of the diameter of unsound knots (in inches) is less than or equal to ½ of the diameter of the log (inches).
[4]l.e. means less than or equal to.
[5]D means d.i.b. of log at location of knot.

LOG GRADES FOR JACK PINE AND RED PINE

Grade 1: logs with three or four clear faces.[5]

Grade 2: logs with one or two clear faces.

Grade 3: logs with no clear faces.

After the tentative log grade is established from above, the log will be degraded one grade for each of the following, except that no log can be degraded below grade 3. Net scale after deduction for defect must be at least 50 percent of the gross contents of the log.

1. *Sweep.* Degrade any tentative 1 or 2 log one grade if sweep amounts to 3 or more inches and equals or exceeds one-third the diameter inside bark at small end.

2. *Heart rot.* Degrade any tentative 1 or 2 log grade if conk, massed hyphae, or other evidence of advance heart rot is found anywhere in it.

[5]*A face is one-fourth of the circumference in width extending full length of the log. Clear faces are those free of: knots measuring more than ½ inches in diameter, overgrown knots of any size, and holes more than ¼ inches in diameter. Faces may be rotated to obtain the maximum number of clear ones.*

LOG GRADES FOR ALL OTHER SOFTWOOD LOGS

Grade 1

1. Logs must be 16 inches in diameter or larger, 10 feet or longer, and with deduction for defect not more than 30 percent of gross scale.

2. Logs must be at least 75 percent clear on each of three faces.

3. All knots outside clear cutting must be sound and not over 2½-inches in size.

Grade 2

1. Logs must be 12 inches in diameter or larger, 10 feet or longer, and with a net scale after deduction for defect of at least 50 percent of the gross contents of the log.

2. Logs must be at least 50 percent clear on each of three faces or 75 percent clear on two faces.

Grade 3

1. Lots must be 6 inches in diameter or larger, 8 feet or longer, and with a net scale after deduction for defect or at least 50 percent of the gross contents of the log.

Note: (A) Diameters are diameter inside bark (d.o.b.) at small end of log.
(B) Percent clear refers to percent clear in one continuous section.

TREE SPECIES GROUPS IN WISCONSIN[6]

SOFTWOODS
- Jack pine ..... *Pinus banksiana*
- Red pine ..... *Pinus resinosa*
- Eastern white pine ..... *Pinus strobus*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Eastern redcedar ..... *Juniperus virginiana*
- Northern white-cedar ..... *Thuja occidentalis*
- Other softwoods
  - Norway spruce ..... *Picea abies*
  - Scotch pine ..... *Pinus sylvestris*

HARDWOODS
- White oaks
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus macrocarpa*
  - Chinkapin oak ..... *Quercus muehlenbergii*
- Select red oak
  - Northern red oak ..... *Quercus rubra*
- Other red oaks
  - Northern pin oak ..... *Quercus ellipsoidalis*
  - Black oak ..... *Quercus velutina*
- Select hickory
  - Shagbark hickory ..... *Carya ovata*
- Other hickory
  - Bitternut hickory ..... *Carya cordiformis*
- Yellow birch ..... *Betula alleghaniensis*
- Hard maple
  - Sugar maple ..... *Acer saccharum*
  - Black maple ..... *Acer nigrum*
- Soft maples
  - Red maple ..... *Acer rubrum*
  - Silver maple ..... *Acer saccharinum*
- Ashes
  - White ash ..... *Fraxinus americana*
  - Black ash ..... *Fraxinus nigra*
  - Green ash ..... *Fraxinus pennsylvanica*
- Balsam poplar ..... *Populus balsamifera*
- Eastern cottonwood ..... *Populus deltoides*
- Sycamore ..... *Platanus occidentalis*
- Aspens
  - Bigtooth aspen ..... *Populus grandidentata*
  - Quaking aspen ..... *Populus tremuloides*
- American basswood ..... *Tilia americana*
- Beech ..... *Fagus grandifolia*
- Black walnut ..... *Juglans nigra*
- Black cherry ..... *Prunus serotina*
- Butternut ..... *Juglans cinerea*
- Elms
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasii*
- Hackberry ..... *Celtis occidentalis*
- Paper birch ..... *Betula papyrifera*
- Black willow ..... *Salix nigra*
- Other hardwoods
  - Boxelder ..... *Acer negundo*
  - Black locust ..... *Robinia pseudoacacia*
  - Honeylocust ..... *Gleditsia triacanthos*
  - River birch ..... *Betula nigra*
  - Red mulberry ..... *Morus rubra*
  - Blackgum ..... *Nyssa silvatica*
  - Northern catalpa ..... *Catalpa speciosa*
- Noncommercial species
  - Mountain maple ..... *Acer spicatum*
  - Eastern hophornbeam ..... *Ostrya virginiana*
  - Peachleaf willow ..... *Salix amygdaloides*
  - American hornbeam ..... *Carpinus caroliniana*
  - Hawthorn ..... *Crataegus* spp.
  - Striped maple ..... *Acer pennsylvanicum*
  - Mountain ash ..... *Sorbus* spp.
  - Pin cherry ..... *Prunus pennsylvanica*
  - Chokecherry ..... *Prunus virginiana*

[6]*The common and scientific names are based on: Little, Elbert L. Check list of native and naturalized trees of the United States. Agric. Handb. 541. Washington, DC: U.S. Department of Agriculture, Forest Service; 1979. 375 p.*

METRIC EQUIVALENTS OF UNITS USED IN THIS REPORT

1 acre = 4,046.86 square meters or 0.405 hectare.
1,000 acres = 405 hectares.
1 cubic foot = 0.0283 cubic meter.
1 foot = 30.48 centimeters or 0.3048 meter.
1 inch = 25.4 millimeters, 2.54 centimeters, or 0.0254 meter.
1 pound = 0.454 kilogram.
1 ton = 0.907 metric ton.

DEFINITION OF TERMS

Acceptable trees.--*Growing-stock trees* of commercial species that meet specified standards of size and quality. These trees would be favored by forest managers.

Basal area.--The area in square feet of the cross section at breast height of a single tree. When the basal area of all trees in a stand are summed, the result

is usually expressed as square feet of basal area per acre.

Biomass.--The above-ground volume of all live trees (including bark and foliage). Biomass is made up of 5 components:

Growing-stock bole.--Biomass of a growing-stock tree from a 1-foot stump to a variable 4-inch top.

Growing-stock tops and limbs.--Biomass of a growing-stock tree from a 1-foot stump minus the growing-stock bole.

Cull bole.--Biomass of a cull tree from a 1-foot stump to a variable 4-inch top.

Cull tops and limbs.--Biomass of a cull tree from a 1-foot stump minus the cull hole.

1- to 5-inch trees.--Biomass of all live trees from 1 to 5 inches in diameter at breast height.

Commercial forest land.--Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization. (Note: Areas qualifying as commercial forest land are capable of producing more than 20 cubic feet per acre per year of annual growth when managed. Currently inaccessible and inoperable areas are included except when the areas involved are small and unlikely to become suitable for producing industrial wood in the foreseeable future.)

Commercial species.--Trees species presently or prospectively suitable for industrial wood products. (Note: Excludes species of typically small size, poor form, or inferior quality such as hophornbeam and hawthorn.)

County and municipal land.--Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Cull.--Portions of a tree that are unusable for industrial wood products because of rot, form, or other defect.

Diameter classes.--A classification of trees based on diameter outside bark, measured at breast height (4-½ feet above the ground). (Note: D.b.h. is the common abbreviation for diameter at breast height. Two-inch diameter classes are commonly used in Forest Survey, with the even inch the approximate midpoint for a class. For example, the 6-inch class includes trees 5.0 through 6.9 inches d.b.h.)

Farm.--Any land from which $1,000 or more of agricultural products were produced and sold during the year.

Farmer-owned land.--Land owned by farm operators. (Note: Excludes land leased by farm operators from nonfarm owners, such as railroad companies and States.)

Forest land.--Land at least 16.7 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use. (Note: Stocking is measured by comparing specified standards with basal area and/or number of trees, age or size, and spacing.) The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, or other bodies of water or clearings in forest areas shall be classed as forest if less than 120 feet wide. Also see definitions for land area, commercial forest land, noncommercial forest land, productive-reserved forest land, stocking, unproductive forest land, and water.

Forest industry land.--Land owned by companies or individuals operating primary wood-using plants.

Forest trees.--Woody plants having a well-developed stem and usually more than 12 feet tall at maturity.

Forest type.--A classification of forest land based on the species forming a plurality of live tree stocking. Major forest types in the State are:

Jack pine.--Forests in which jack pine comprises a plurality of the stocking. (Common associates include eastern white pine, red pine, aspen, birch, and oak.)

Red pine.--Forests in which red pine comprises a plurality of the stocking. (Common associates include eastern white pine, jack pine, aspen, birch, and oak.)

White pine.--Forests in which eastern white pine comprises a plurality of the stocking. (Common associates include red pine, aspen, birch, and maple.)

Balsam fir.--Forests in which balsam fir and white spruce comprise a plurality of stocking with balsam fir the most common. (Common associates include white spruce, aspen, maple, birch, northern white-cedar, and spruce.)

White spruce.--Forests in which white spruce and balsam fir comprise a plurality of the stocking with white spruce the most common. (Common associates include balsam fir, aspen, maple, birch, and northern white-cedar.)

Black spruce.--Forests in which swamp conifers comprise a plurality of the stocking with black spruce the most common. (Common associates include tamarack, northern white-cedar, and balsam fir.)

Northern white-cedar.--Forests in which swamp conifers comprise a plurality of the stocking with northern white-cedar the most common. (Common associates include balsam fir, black ash, spruce, and black spruce.)

Tamarack.--Forests in which swamp conifers comprise a plurality of the stocking with tamarack the most common. (Common associates include black spruce, balsam fir, and aspen.)

Oak-hickory.--Forests in which northern red oak,

bur oak, or hickories, singly or in combination, comprise a plurality of the stocking. (Common associates include jack pine, aspen, birch, and maple.)

Elm-ash-soft maple.--Forests in which lowland elm, ash, cottonwood, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include aspen, birch, and balsam fir.)

Maple-birch.--Forests in which sugar maple, basswood, yellow birch, elm, and red maple, singly or in combination, comprise a plurality of the stocking. (Common associates include white pine, elm, hemlock, and basswood.)

Aspen.--Forests in which quaking aspen or bigtooth aspen, singly or in combination, comprise a plurality of the stocking. (Common associates include oak, pine, balsam fir, and paper birch.)

Paper birch.--Forests in which paper birch comprises a plurality of the stocking. (Common associates include maple, aspen, and balsam fir.)

Exotic.--Forests in which species not native to the State comprise a plurality of the stocking. (Mostly Scotch pine plantations.)

Gross area.--The entire area of land and water as determined by the Bureau of the Census, 1970.

Growing-stock trees.--Live trees of commercial species, excluding rough and rotten trees.

Growing-stock volume.--Net volume in cubic feet of growing-stock trees 5 inches d.b.h. and over, from a 1-foot stump to a minimum 4 inch top diameter outside bark of the central stem or to the point where the central stem breaks into limbs. Cubic feet can be converted to standard cords by dividing by 79. One standard cord is 128 cubic feet of stacked wood, including bark and air.

Hardwoods.--Dicotyledonous trees, usually broadleaved and deciduous.

Idle farmland.--Includes former cropland, orchards, improved pastures, and farm sites not tended within the past 2 years and presently less than 16.7 percent stocked with trees.

Improved pasture.--Land currently improved for grazing by cultivating, seeding, irrigating, or clearing of trees or brush and less than 16.7 percent stocked with live trees.

Land area.--A. *Bureau of the Census.* The area of dry land and land temporarily or partly covered by water such as marshes, swamps, and river flood plains (omitting tidal flats below mean high tide); streams, sloughs, estuaries, and canals less than one-eighth of a statute mile wide; and lakes, reservoirs, and ponds less than 40 acres in area.

B. *Forest Inventory and Analysis.* The same as the Bureau of the Census, except minimum width of streams, etc., is 120 feet and minimum size of lakes, etc., is 1 acre.

Live trees.--Growing-stock, rough, and rotten trees 1 inch d.b.h. and larger.

Log grades.--A classification of logs based on external characteristics as indicators of quality or value. (See Appendix for specific grading factors used.)

Logging residues.--The unused growing stock portions of trees cut or killed by logging.

Maintained road.--Any road, hard-topped or other surfaces, that is plowed or graded at least once a year. Includes right-of-way that are cut or treated to limit herbaceous growth.

Marsh.--Nonforest land that characteristically supports low, generally herbaceous or shrubby vegetation and that is intermittently covered with water.

Merchantable.--Refers to a pulpwood or saw log section that meets pulpwood or saw log specifications, respectively.

Miscellaneous federal land.--Federal land other than National Forest, land administered by the Bureau of Land Management, and Indian land.

Miscellaneous private land.--Privately owned land other than forest-industry and farmer-owned land.

Mortality.--The volume of sound wood in growing-stock and sawtimber trees that die annually.

National Forest land.--Federal land that has been legally designated as National Forest or purchase units, and other land administered by the USDA Forest Service.

Net annual growth of growing stock.--The annual change in volume of sound wood in live sawtimber and poletimber trees and the total volume of trees entering these classes through ingrowth, less volume losses resulting from natural causes.

Net annual growth of sawtimber.--The annual change in the volume of live sawtimber trees and the total volume of trees reaching sawtimber size, less volume losses resulting from natural causes.

Net volume.--Gross volume less deductions for rot, sweep, or other defect affecting use for timber products.

Noncommercial forest land.--(a) Unproductive forest land and (b) productive-reserved forest land.

Noncommercial species.--Tree species of typically small size, poor form, or inferior quality that normally do not develop into trees suitable for industrial wood products.

Nonforest land.--Land that has never supported forests, and land formerly forested where use for timber management is precluded by development for other uses. (Note: Includes areas used for crops, improved pasture, residential areas, city parks, improved roads of any width and adjoining clearings, powerline clearings of any width, and 1- to 40-acre areas of water classified by the Bureau of the Census as land. If intermingled in forest areas, unimproved roads and nonforest strips must be more than 120

feet wide and more than 1 acre in area to quality as nonforest land.)

a. *Nonforest land without trees.*--Nonforest land with no live trees present.

b. *Nonforest land with trees.*--Nonforest land with one or more trees per acre at least 5 inches d.b.h.

Nonstocked land.--Commercial forest land less than 16.7 percent stocked with growing-stock trees.

Other removals.--Growing-stock trees removed but not utilized for products, or trees left standing but "removed" from the commercial forest land classification by land use change. Examples are removals from cultural operations such as timber stand improvement work, land clearing, and changes in land use.

Ownership.--Property owned by one owner, regardless of the number of parcels in a specified area.

Ownership size class.--The amount of commercial forest land owned by one owner, regardless of the number of parcels.

Owner tenure.--The length of time a property has been held by the owner.

Physiographic class.--A measure of soil and water conditions that affect tree growth on a site. The physiographic classes are:

Xeric sites.--Very dry soils where excessive drainage seriously limits both growth and species occurrence. Example: sandy jack pine plains.

Xeromesic sites.--Moderately dry soils where excessive drainage limits growth and species occurrence to some extent. Example: dry oak ridge.

Mesic sites.--Deep, well-drained soils. Growth and species occurrence are limited only by climate.

Hydromesic sites.--Moderately wet soils where insufficient drainage or infrequent flooding limits growth and species occurrence to some extent. Example: better drained bottomland hardwood sites.

Hydric sites.--Very wet sites where excess water seriously limits both growth and species occurrence. Example: frequently flooded river bottoms and spruce bogs.

Plant byproducts.--Plant residues used for products such as mulch, pulp chips, and fuelwood.

Plant residues.--Wood and bark materials generated at manufacturing plants during production of other products.

Poletimber stands.--(See stand-size class.)

Poletimber trees.--Growing-stock trees of commercial species at least 5 inches d.b.h. but smaller than sawtimber size.

Productive-reserved forest land.--Forest land sufficiently productive to qualify as commercial forest land but withdrawn from timber utilization through statute, administration regulation, designation, or exclusive use for Christmas tree production, as indicated by annual shearing.

Productive-deferred.--Forest land sufficiently productive to quality as commercial forest land but presently withdrawn from timber utilization because it is being considered for possible inclusion into the Wilderness system.

Rotten trees.--Live trees of commercial species that do not contain at least one 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, because they do not meet regional specifications for freedom from defect primarily because of rot; that is, when more than 50 percent of extra cull volume in a tree is rotten.

Rough trees.--(a) Live trees of commercial species that do not contain at least one merchantable 12-foot saw log or two saw logs 8 feet or longer, now or prospectively, because they do not meet regional specifications for freedom from defect primarily because of roughness or poor form, and (b) all live trees of noncommercial species.

Roundwood products.--Logs, bolts, or other round sections (including chips from roundwood) cut from trees for industrial or consumer uses. (Note: Includes saw logs, veneer logs and bolts; cooperage logs and bolts; pulpwood; fuelwood; piling; poles; posts; hewn ties; mine timbers; and various other round, split, or hewn products.)

Salvable dead trees.--Standing or down dead trees considered merchantable by regional standards.

Saplings.--Live trees 1 to 5 inches d.b.h.

Sapling-seeding stands.--(See stand-size class.)

Saw log.--A log meeting minimum standards of diameter, length, and defect, including logs at least 8 feet long, sound and straight and with a minimum diameter outside bark (d.o.b.) for softwoods of 7 inches (9 inches for hardwoods) or other combinations of size and defect specified by regional standards.

Saw log portion.--That part of the bole of sawtimber trees between the stump and the saw log top.

Saw log top.--The point on the bole of sawtimber trees above which a saw log cannot be produced. The minimum saw log top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

Sawtimber stands.--(See stand-size class.)

Sawtimber trees.--Growing-stock trees of commercial species containing at least a 12-foot saw log or two noncontiguous saw logs 8 feet or longer, and meeting regional specifications for freedom from defect. Softwoods must be at least 9 inches d.b.h. Hardwoods must be at least 11 inches d.b.h.

Sawtimber volume.--Net volume of the saw log portion of live sawtimber in board feet, International ¼-inch rule, from stump to a minimum 7 inches top diameter outside bark (d.o.b.) for softwoods and a minimum 9 inches top d.o.b. for hardwoods.

Seedlings.--Live trees less than 1 inch d.b.h. that are expected to survive. Only softwood seedlings more than 6 inches tall and hardwood seedlings more than 1 foot tall are counted.

Short-log (rough tree).--Sawtimber-size trees of commercial species that contain at least one merchantable 8- to 11-foot saw log but not a 12-foot saw log.

Site class.--A classification of forest land in terms of inherent capacity to grow crops of industrial wood based on fully stocked natural stands.

Site index.--An expression of forest site quality based on the height of a free-growing dominant or codominant tree of a representative species in the forest type at age 50.

Softwoods.--Coniferous trees, usually evergreen, having needles or scale-like leaves.

Stand.--A growth of trees on a minimum of 1 acre of forest land that is stocked by forest trees of any size.

Stand-age class.--Age of the main stand. Main stand refers to trees of the dominant forest type and stand-size class.

Stand-area class.--The extent of a continuous forested area of the same forest type, stand-size class, and stand-density class.

Stand-size class.--A classification of forest land based on the size class of growing-stock trees on the area; that is, sawtimber, poletimber, or seedlings and saplings.

a. *Sawtimber stands*.--Stands at least 16.7 percent stocked with growing-stock trees, with half or more of total stocking in sawtimber or poletimber trees, and with sawtimber stocking at least equal to poletimber stocking.

b. *Poletimber stands*.--Stands at least 16.7 percent stocked with growing-stock trees of which half or more of this stocking is in poletimber and/or sawtimber trees, and with poletimber stocking exceeding that of sawtimber.

c. *Sapling-seedling stands*.--Stands at least 16.7 percent stocked with growing-stock trees of which more than half of the stocking is saplings and/or seedlings.

d. *Nonstocked stands*.--Stands in which stocking of growing-stock trees is less than 16.7 percent.

State land.--Land owned either by States or leased to them, for 50 years or more.

Stocking.--The degree of occupancy of land by trees, measured by basal area and/or the number of trees in a stand by size or age and spacing, compared to the basal area and/or number of trees required to fully utilize the growth potential of the land; that is, the stocking standard.

A stocking percent of 100 indicates full utilization of the site and is equivalent to 80 square feet of basal area per acre in trees 5 inches d.b.h. and larger. In a stand of trees less than 5 inches d.b.h., a stocking percent of 100 would indicate that the present number of trees is sufficient to produce 80 square feet of basal area per acre when the trees reach 5 inches d.b.h.

Stands are grouped into the following stocking classes:

Overstocked stands.--Stands in which stocking of trees is 134.0 percent or more.

Fully stocked stands.--Stands in which stocking of trees is from 101.0 to 133.9 percent.

Medium stocked stands.--Stands in which stocking of trees is from 61.0 to 100.9 percent.

Poorly stocked stands.--Stands in which stocking of trees is from 16.7 to 60.9 percent.

Nonstocked areas.--Commercial forest land on which stocking of trees is less than 16.7 percent.

Timber removals from growing stock.--The volume of sound wood in growing-stock trees removed annually for forest products (including roundwood products and logging residues) and for other removals.

Timber removals from sawtimber.--The net board-foot volume of live sawtimber trees removed for forest products annually (including roundwood products and logging residues) and for other removals.

Timber products output.--All timber products cut from roundwood and byproducts of wood manufacturing plants. Roundwood products include logs, bolts, or other round sections cut from growing-stock trees, cull trees, salvable dead trees, trees on nonforest land, noncommercial species, sapling-size trees, and limbwood. Byproducts from primary manufacturing plants include slabs, edging, trimmings, miscuts, sawdust, shavings, veneer cores and clippings, and screenings of pulpmills that are used as pulpwood chips or other products.

Tree biomass.--The total aboveground weight (including the bark) of all trees from 1 to 5 inches d.b.h., and the total aboveground weight (including the bark) from a 1-foot stump for trees more than 5 inches in diameter.

Tree size class.--A classification of trees based on diameter at breast height, including sawtimber trees, poletimber trees, saplings, and seedlings.

Unproductive forest land.--Forest land incapable of producing 20 cubic feet per acre of annual growth or of yielding crops of industrial wood under natural conditions because of adverse site conditions. (Note: Adverse conditions include shallow soil, dry climate, poor drainage, high elevation, steepness, and rockiness).

Upper stem portion.--That part of the bole of sawtimber trees above the saw log top to a minimum top diameter of 4 inches outside bark or to the point

where the central stem breaks into limbs.

Urban and other areas.--Areas within the legal boundaries of cities and towns; suburban areas developed for residential, industrial, or recreational purposes; schoolyards; cemeteries, roads; railroads; airports; beaches; powerlines; and other rights-of-way; or other nonforest land not included in any other specified land use class.

Water.--(a) *Bureau of the Census*.--Permanent inland water surfaces, such as lakes, reservoirs, and ponds at least 40 acres in area; and streams, sloughs, estuaries, and canals at least one-eighth of a statute mile wide.

(b) *Noncensus*.--Permanent inland water surfaces, such as lakes, reservoirs, and ponds from 1 to 39.9 acres in area; and streams, sloughs, estuaries, and canals from 120 feet to one-eighth of a statute mile wide.

Wooded pasture.--Improved pasture with more than 16.7 percent stocking in live trees but less than 25 percent stocking in growing-stock trees. Area is currently improved for grazing or there is other evidence of grazing.

Wooded strip.--An acre or more of natural continuous forest land that would otherwise meet survey standards for commercial forest land except that it is less than 120 feet wide.

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(In thousand acres)

Land class	1968	1983
Forest land		
Commercial forest land		
Jack pine	21.8	11.2
Red pine	23.4	40.1
White pine	2.6	13.7
Balsam fir	--	--
White spruce	--	2.5
Black spruce	--	--
Northern white-cedar	--	--
Tamarack	--	--
Oak-hickory	867.9	1,063.4
Elm-ash-soft maple	93.7	117.8
Maple-birch	324.9	497.9
Aspen	75.0	85.7
Paper birch	34.7	54.4
Nonstocked	49.1	33.3
Subtotal	1,493.1	1,920.0
Noncommercial forest land		
Unproductive	7.0	--
Productive-reserved	12.3	38.8
Subtotal	19.3	38.8
Total	1,512.4	1,958.8
Nonforest land		
Cropland	2,935.5	2,902.6
Pasture and range	743.3	712.5
Other	987.9	576.6
Total	4,666.7	4,191.7
Total land	6,179.1	6,150.5
Water (Bureau of the Census)	123.6[1/]	136.6[2/]
Total land and water	6,302.7[1/]	6,287.1[2/]

[1/] U.S. Department of Commerce, Bureau of Census, 1960.

[2/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 2.--Area of land by land use class and county, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Land use class	All counties	County							
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin
Forest land									
Commercial forest	1,920.0	187.9	167.8	170.0	184.5	136.0	121.6	37.6	53.4
Unproductive forest	--	--	--	--	--	--	--	--	--
Productive reserved	38.8	5.5	1.0	1.1	1.9	4.7	--	0.6	0.5
Total	1,958.8	193.4	168.8	171.1	186.4	140.7	121.6	38.2	53.9
Nonforest land									
Nonforest with trees									
Cropland with trees	7.4	--	--	--	--	--	--	2.6	--
Improved pasture with trees	115.9	--	--	2.4	9.1	31.2	--	26.0	--
Wooded strips	10.2	2.7	--	--	--	2.6	--	2.3	--
Idle farmland with trees	12.5	--	--	2.4	--	2.7	--	2.4	--
Marsh with trees	12.7	2.8	--	5.0	--	--	--	--	--
Urban and other windbreaks	8.7	--	--	2.6	--	--	1.2	--	--
Windbreaks	12.2	--	--	--	--	--	--	--	--
Wooded pasture	47.4	--	2.8	2.6	21.2	10.6	--	4.7	--
Subtotal	227.0	5.5	2.8	15.0	30.3	47.1	1.2	38.0	--
Nonforest without trees									
Cropland without trees	2,895.2	225.7	148.0	265.4	415.8	235.1	113.9	226.7	62.7
Improved pasture without trees	549.2	5.2	7.5	41.3	72.3	43.2	--	95.3	19.2
Idle farm without trees	20.5	--	--	--	--	7.7	--	--	--
Marsh without trees	55.1	2.5	5.0	9.9	--	--	13.3	--	4.8
Other farm-farmstead	66.0	2.5	2.5	2.4	7.5	--	--	2.6	2.4
Urban and other	372.1	12.8	27.5	41.1	19.9	12.7	42.6	5.1	4.8
Noncensus water	6.6	--	--	--	--	--	--	--	--
Subtotal	3,964.7	248.7	190.5	360.1	515.5	298.7	169.8	329.7	93.9
Total	4,191.7	254.2	193.3	375.1	545.8	345.8	171.0	367.7	93.9
Total land	6,150.5	447.6	362.1	546.2	732.2	486.5	292.6	405.9	147.8
Water (Bureau of the Census)[1/]	136.6	6.6	20.7	6.5	23.8	4.1	14.8	11.1	11.1
Total land and water[1/]	6,287.1	454.2	382.8	552.7	756.0	490.6	307.4	417.0	158.9

(Table 2 continued on next page)

[1/] U.S. Department of Commerce, Bureau of Census, 1980.

(Table 2 continued)

Land use class	County					
	Pierce	Richland	St. Croix	Sauk	Trempealeau	Vernon
Forest land						
Commercial forest	100.6	158.7	72.9	181.7	147.0	200.3
Unproductive forest	--	--	--	--	--	--
Productive reserved	1.5	0.7	4.8	10.3	4.1	2.1
Total	102.1	159.4	77.7	192.0	151.1	202.4
Nonforest land						
Nonforest with trees						
Cropland with trees	--	--	--	4.8	--	--
Improved pasture with trees	9.7	2.2	4.9	7.3	18.1	5.0
Wooded strips	--	--	--	--	2.6	--
Idle farmland with trees	--	--	--	2.5	--	2.5
Marsh with trees	2.4	--	--	--	--	2.5
Urban and other windbreaks	4.9	--	--	--	--	--
Windbreaks	4.9	--	--	4.8	2.5	--
Wooded pasture	--	2.8	--	--	2.7	--
Subtotal	21.9	5.0	4.9	19.4	25.9	10.0
Nonforest without trees						
Cropland without trees	181.8	149.3	285.7	219.0	184.1	182.0
Improved pasture without trees	24.4	38.2	27.3	34.0	61.3	80.0
Idle farm without trees	2.4	--	7.9	2.5	--	--
Marsh without trees	2.4	2.2	2.5	4.9	7.6	--
Other farm-farmstead	9.7	6.8	7.4	14.5	5.2	2.5
Urban and other	24.3	13.2	46.7	48.3	33.1	40.0
Noncensus water	--	--	2.4	1.6	2.6	--
Subtotal	245.0	209.7	379.9	324.8	293.9	304.5
Total	266.9	214.7	384.8	344.2	319.8	314.5
Total land	369.0	374.1	462.5	536.2	470.9	516.9
Water (Bureau of the Census)[1/]	9.7	3.8	8.5	6.7	3.9	5.3
Total land and water[1/]	378.7	377.9	471.0	542.9	474.8	522.2

[1/] U.S. Department of Commerce, Bureau of Census, 1980.

Table 3.--Area of commercial forest land by ownership class and county, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Buffalo	187.9	--	--	5.6	--	--	--	149.4	8.3	24.6
Crawford	167.8	--	8.4	--	--	--	--	81.1	8.4	69.9
Dunn	170.0	--	--	--	2.6	--	--	91.9	13.1	62.4
Grant	184.5	--	6.2	6.0	3.1	--	--	127.0	6.1	36.1
Iowa	136.0	--	--	8.2	--	--	--	84.4	16.2	27.2
La Crosse	121.6	--	3.3	6.6	--	--	--	69.5	9.9	32.3
Lafayette	37.6	--	--	--	--	--	--	28.2	--	9.4
Pepin	53.4	--	--	2.8	--	--	--	42.1	--	8.5
Pierce	100.6	--	--	--	2.7	--	--	89.7	--	8.2
Richland	158.7	--	--	--	--	--	--	103.0	13.9	41.8
St. Croix	72.9	--	--	5.6	--	--	--	31.0	5.7	30.6
Sauk	181.7	--	--	--	2.5	--	--	111.9	5.0	62.3
Trempealeau	147.0	--	--	--	--	--	--	118.2	--	28.8
Vernon	200.3	--	11.9	--	--	--	--	128.5	6.2	53.7
All counties	1,920.0	--	29.8	34.8	10.9	--	--	1,255.9	92.8	495.8

Table 4.--Area of commercial forest land by ownership class and site class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
National Forest	--	--	--	--	--	--	--
Miscellaneous federal	29.8	--	--	--	14.4	9.0	6.4
State	34.8	--	--	--	8.8	11.6	14.4
County and municipal	10.9	--	--	--	--	--	10.9
Indian	--	--	--	--	--	--	--
Forest industry	--	--	--	--	--	--	--
Farmer	1,255.9	--	--	42.8	299.8	534.2	379.1
Misc. private-corporation	92.8	--	--	--	24.0	40.3	28.5
Misc. private-individual	495.8	--	--	26.1	109.7	211.3	148.7
All owners	1,920.0	--	--	68.9	456.7	806.4	588.0

Table 5.--Area of commercial forest land by ownership class and stand-volume class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All classes	Stand-volume class (board feet[1/]) Less than 1,500	1,500 to 5,000	5,000+
National Forest	--	--	--	--
Miscellaneous federal	29.8	14.9	9.0	5.9
State	34.8	17.3	11.7	5.8
County and municipal	10.9	10.9	--	--
Indian	--	--	--	--
Forest industry	--	--	--	--
Farmer	1,255.9	407.4	586.8	261.7
Misc. private-corporation	92.8	32.4	57.3	3.1
Misc. private-individual	495.8	215.6	199.6	80.6
All owners	1,920.0	698.5	864.4	357.1

[1/] International 1/4-inch rule.

Table 6.--Area of privately owned commercial forest land by ownership class, owner tenure, and size of holding, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Ownership class and owner tenure class	All sizes	Size of holding (acres) 1-4	5-10	11-20	21-50	51-100	101-500	501-2,500	2,501-5,000	5001+
Forest industry										
1-4 years	--	--	--	--	--	--	--	--	--	--
5-9 years	--	--	--	--	--	--	--	--	--	--
10-19 years	--	--	--	--	--	--	--	--	--	--
20+ years	--	--	--	--	--	--	--	--	--	--
All classes	--	--	--	--	--	--	--	--	--	--
Farmer										
1-4 years	225.1	--	--	16.3	60.2	53.7	91.7	--	3.2	--
5-9 years	298.1	5.6	--	11.0	82.9	84.0	108.5	6.1	--	--
10-19 years	383.3	2.7	5.5	15.8	111.6	100.6	141.7	5.4	--	--
20+ years	349.4	5.4	14.1	7.4	79.0	123.4	120.1	--	--	--
All classes	1,255.9	13.7	19.6	50.5	333.7	361.7	462.0	11.5	3.2	--
Misc. priv.-corporation										
1-4 years	25.1	--	--	--	5.6	5.5	11.2	2.8	--	--
5-9 years	25.6	--	--	--	5.4	5.6	11.9	2.7	--	--
10-19 years	28.2	--	--	--	3.3	8.9	13.2	2.8	--	--
20+ years	13.9	--	--	--	2.7	--	8.5	2.7	--	--
All classes	92.8	--	--	--	17.0	20.0	44.8	11.0	--	--
Misc. priv.-individual										
1-4 years	132.8	--	6.0	17.1	49.2	29.3	28.2	3.0	--	--
5-9 years	136.9	--	12.8	2.6	48.6	33.5	39.4	--	--	--
10-19 years	160.8	2.4	5.3	16.9	41.2	36.7	49.6	--	--	--
20+ years	65.3	--	--	4.9	17.0	11.0	27.0	5.4	--	--
All classes	495.8	2.4	24.1	41.5	156.0	110.5	144.2	17.1	--	--
All private owners										
1-4 years	383.0	--	6.0	33.4	115.0	88.5	131.1	5.8	3.2	--
5-9 years	460.6	5.6	12.8	13.6	136.9	123.1	159.8	8.8	--	--
10-19 years	572.3	5.1	10.8	32.7	156.1	146.2	204.5	16.9	--	--
20+ years	428.6	5.4	14.1	12.3	98.7	134.4	155.6	8.1	--	--
All classes	1,844.5	16.1	43.7	92.0	506.7	492.2	651.0	39.6	3.2	--

Table 7.--Area of commercial forest land by forest type, stand-size class, and ownership class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Jack pine										
Sawtimber	5.9	--	--	--	--	--	--	5.9	--	--
Poletimber	2.5	--	--	--	2.5	--	--	--	--	--
Sapling & seedling	2.8	--	--	--	--	--	--	2.8	--	--
All stands	11.2	--	--	--	2.5	--	--	8.7	--	--
Red pine										
Sawtimber	3.3	--	--	--	--	--	--	3.3	--	--
Poletimber	26.2	--	--	--	--	--	--	8.1	2.6	15.5
Sapling & seedling	10.6	--	--	--	--	--	--	--	5.3	5.3
All stands	40.1	--	--	--	--	--	--	11.4	7.9	20.8
White pine										
Sawtimber	3.4	--	--	--	--	--	--	--	--	3.4
Poletimber	2.6	--	--	--	--	--	--	2.6	--	--
Sapling & seedling	7.7	--	2.5	--	--	--	--	2.6	--	2.6
All stands	13.7	--	2.5	--	--	--	--	5.2	--	6.0
Balsam fir										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--
White spruce										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.5	--	--	--	--	--	--	--	--	2.5
All stands	2.5	--	--	--	--	--	--	--	--	2.5
Black spruce										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--
Northern white-cedar										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--

(Table 7 continued on next page)

(Table 7 continued)

Forest type and stand-size class	All owners	Ownership class: National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Tamarack										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--
Oak-hickory										
Sawtimber	732.6	--	--	9.0	--	--	--	527.0	31.7	164.9
Poletimber	187.7	--	--	--	--	--	--	118.3	13.7	55.7
Sapling & seedling	143.1	--	--	6.1	--	--	--	67.5	8.2	61.3
All stands	1,063.4	--	--	15.1	--	--	--	712.8	53.6	281.9
Elm-ash-soft maple										
Sawtimber	64.9	--	14.9	5.8	--	--	--	29.8	8.3	6.1
Poletimber	17.5	--	3.3	2.7	--	--	--	5.6	3.0	2.9
Sapling & seedling	35.4	--	2.8	5.6	2.6	--	--	16.0	--	8.4
All stands	117.8	--	21.0	14.1	2.6	--	--	51.4	11.3	17.4
Maple-birch										
Sawtimber	223.3	--	3.1	--	--	--	--	162.5	12.0	45.7
Poletimber	119.0	--	--	--	--	--	--	80.8	--	38.2
Sapling & seedling	155.6	--	--	2.8	5.8	--	--	104.3	2.8	39.9
All stands	497.9	--	3.1	2.8	5.8	--	--	347.6	14.8	123.8
Aspen										
Sawtimber	22.1	--	--	--	--	--	--	22.1	--	--
Poletimber	39.1	--	--	2.8	--	--	--	25.3	--	11.0
Sapling & seedling	24.5	--	--	--	--	--	--	11.4	2.5	10.6
All stands	85.7	--	--	2.8	--	--	--	58.8	2.5	21.6
Paper birch										
Sawtimber	18.9	--	--	--	--	--	--	16.3	--	2.6
Poletimber	27.3	--	--	--	--	--	--	19.4	2.7	5.2
Sapling & seedling	8.2	--	--	--	--	--	--	5.4	--	2.8
All stands	54.4	--	--	--	--	--	--	41.1	2.7	10.6
Exotic										
Sawtimber	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--
Nonstocked	33.3	--	3.2	--	--	--	--	18.9	--	11.2
All types										
Sawtimber	1,074.4	--	18.0	14.8	--	--	--	766.9	52.0	222.7
Poletimber	421.9	--	3.3	5.5	2.5	--	--	260.1	22.0	128.5
Sapling & seedling	390.4	--	5.3	14.5	8.4	--	--	210.0	18.8	133.4
Nonstocked	33.3	--	3.2	--	--	--	--	18.9	--	11.2
All stands	1,920.0	--	29.8	34.8	10.9	--	--	1,255.9	92.8	495.8

Table 8.--Area of commercial forest land by forest type and county, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All counties	County							
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin
Jack pine	11.2	--	--	2.6	--	--	3.3	--	2.8
Red pine	40.1	--	--	13.1	--	2.7	3.3	--	--
White pine	13.7	--	--	--	--	--	3.4	--	--
Balsam fir	--	--	--	--	--	--	--	--	--
White spruce	2.5	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--
Oak-hickory	1,063.4	121.8	103.5	78.6	124.0	100.9	79.3	21.2	25.3
Elm-ash-soft maple	117.8	13.8	19.6	10.4	12.2	8.3	6.6	--	8.4
Maple-birch	497.9	13.8	33.5	52.3	42.2	16.0	13.2	16.4	11.3
Aspen	85.7	16.6	--	7.8	6.1	2.7	9.2	--	2.8
Paper birch	54.4	19.1	5.6	5.2	--	2.7	3.3	--	2.8
Exotic	--	--	--	--	--	--	--	--	--
Nonstocked	33.3	2.8	5.6	--	--	2.7	--	--	--
All types	1,920.0	187.9	167.8	170.0	184.5	136.0	121.6	37.6	53.4

(Table 8 continued)

(Table 8 continued)

Forest type	County					
	Pierce	Richland	St.Croix	Sauk	Trempealeau	Vernon
Jack pine	--	--	--	2.5	--	--
Red pine	--	--	8.1	5.0	7.9	--
White pine	--	--	--	--	7.8	2.5
Balsam fir	--	--	--	--	--	--
White spruce	--	--	2.5	--	--	--
Black spruce	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--
Oak-hickory	24.8	61.4	19.9	104.5	78.8	119.4
Elm-ash-soft maple	5.5	5.5	11.3	2.5	10.6	3.1
Maple-birch	56.9	89.0	5.7	57.2	18.3	72.1
Aspen	8.2	2.8	16.8	7.5	5.2	--
Paper birch	--	--	--	--	15.7	--
Exotic	--	--	--	--	--	--
Nonstocked	5.2	--	8.6	2.5	2.7	3.2
All types	100.6	158.7	72.9	181.7	147.0	200.3

Table 9.--Area of commercial forest land by county and stand-size class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

County	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Buffalo	187.9	127.1	38.5	19.5	2.8
Crawford	167.8	98.0	30.7	33.5	5.6
Dunn	170.0	75.9	57.6	36.5	--
Grant	184.5	133.2	30.1	21.2	--
Iowa	136.0	65.5	38.1	29.7	2.7
La Crosse	121.6	86.0	19.9	15.7	--
Lafayette	37.6	23.5	2.4	11.7	--
Pepin	53.4	30.9	11.2	11.3	--
Pierce	100.6	46.7	21.8	26.9	5.2
Richland	158.7	75.1	36.2	47.4	--
St. Croix	72.9	11.2	31.4	21.7	8.6
Sauk	181.7	74.5	42.4	62.3	2.5
Trempealeau	147.0	76.2	36.6	31.5	2.7
Vernon	200.3	150.6	25.0	21.5	3.2
All counties	1,920.0	1,074.4	421.9	390.4	33.3

Table 10.--Area of commercial forest land by forest type, stand-size class, and site class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Jack pine							
Sawtimber	5.9	--	--	--	--	--	5.9
Poletimber	2.5	--	--	--	--	--	2.5
Sapling & seedling	2.8	--	--	--	--	2.8	--
All stands	11.2	--	--	--	--	2.8	8.4
Red pine							
Sawtimber	3.3	--	--	3.3	--	--	--
Poletimber	26.2	--	--	18.4	7.8	--	--
Sapling & seedling	10.6	--	--	2.9	5.3	2.4	--
All stands	40.1	--	--	24.6	13.1	2.4	--
White pine							
Sawtimber	3.4	--	--	--	3.4	--	--
Poletimber	2.6	--	--	2.6	--	--	--
Sapling & seedling	7.7	--	--	--	5.1	2.6	--
All stands	13.7	--	--	2.6	8.5	2.6	--
Balsam fir							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
White spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	2.5	--	--	--	--	2.5	--
All stands	2.5	--	--	--	--	2.5	--
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Northern white-cedar							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--

(Table 10 continued on next page)

(Table 10 continued)

Forest type and stand-size class	All classes	Site class (cubic feet of growth per acre per year)					
		225+	165-224	120-164	85-119	50-84	20-49
Tamarack							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Oak-hickory							
Sawtimber	732.6	--	--	5.6	147.2	365.8	214.0
Poletimber	187.7	--	--	--	53.2	86.8	47.7
Sapling & seedling	143.1	--	--	2.5	29.8	69.8	41.0
All stands	1,063.4	--	--	8.1	230.2	522.4	302.7
Elm-ash-soft maple							
Sawtimber	64.9	--	--	--	14.0	28.3	22.6
Poletimber	17.5	--	--	--	2.8	2.9	11.8
Sapling & seedling	35.4	--	--	--	5.1	8.4	21.9
All stands	117.8	--	--	--	21.9	39.6	56.3
Maple-birch							
Sawtimber	223.3	--	--	5.2	31.1	102.1	84.9
Poletimber	119.0	--	--	5.3	59.7	29.1	24.9
Sapling & seedling	155.6	--	--	9.0	26.1	56.5	64.0
All stands	497.9	--	--	19.5	116.9	187.7	173.8
Aspen							
Sawtimber	22.1	--	--	2.8	16.5	--	2.8
Poletimber	39.1	--	--	2.7	16.4	13.8	6.2
Sapling & seedling	24.5	--	--	2.5	14.0	2.8	5.2
All stands	85.7	--	--	8.0	46.9	16.6	14.2
Paper birch							
Sawtimber	18.9	--	--	2.8	2.7	10.7	2.7
Poletimber	27.3	--	--	3.3	5.2	8.0	10.8
Sapling & seedling	8.2	--	--	--	2.6	--	5.6
All stands	54.4	--	--	6.1	10.5	18.7	19.1
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	33.3	--	--	--	8.7	11.1	13.5
All types							
Sawtimber	1,074.4	--	--	19.7	214.9	506.9	332.9
Poletimber	421.9	--	--	32.3	145.1	140.6	103.9
Sapling & seedling	390.4	--	--	16.9	88.0	147.8	137.7
Nonstocked	33.3	--	--	--	8.7	11.1	13.5
All stands	1,920.0	--	--	68.9	456.7	806.4	588.0

Table 11.--Area of commercial forest land by forest type and stand-age class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years) 1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	120-140	141+
Jack pine	11.2	2.8	--	--	2.6	5.8	--	--	--	--	--	--	--	--
Red pine	40.1	2.6	15.8	15.8	5.9	--	--	--	--	--	--	--	--	--
White pine	13.7	2.6	7.7	--	--	--	--	--	3.4	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	2.5	2.5	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oak-hickory	1,063.4	94.2	43.1	32.0	36.3	115.9	92.6	97.0	85.7	123.0	114.2	116.5	79.0	33.9
Elm-ash-soft maple	117.8	24.2	8.4	5.6	5.7	8.8	17.1	8.3	11.4	11.8	5.5	11.0	--	--
Maple-birch	497.9	77.6	52.6	47.4	43.7	29.2	46.9	18.9	17.7	31.1	50.5	53.7	17.3	11.3
Aspen	85.7	7.7	16.0	17.4	11.0	14.3	10.9	5.6	--	--	2.8	--	--	--
Paper birch	54.4	5.4	2.8	3.3	7.8	13.5	16.3	5.3	--	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	33.3	33.3	--	--	--	--	--	--	--	--	--	--	--	--
All types	1,920.0	252.9	146.4	121.5	113.0	187.5	183.8	135.1	118.2	165.9	173.0	181.2	96.3	45.2

Table 12.--Area of commercial forest land by forest type and site-index class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All classes	Site-index class (feet) 11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91+
Jack pine	11.2	--	--	--	2.5	8.7	--	--	--	--
Red pine	40.1	--	--	--	--	--	12.9	13.4	13.8	--
White pine	13.7	--	--	--	--	2.6	5.9	2.6	--	2.6
Balsam fir	--	--	--	--	--	--	--	--	--	--
White spruce	2.5	--	--	--	2.5	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--
Oak-hickory	1,063.4	--	--	35.6	148.7	272.0	257.9	217.5	89.9	41.8
Elm-ash-soft maple	117.8	--	--	5.3	5.6	25.1	37.1	22.8	13.2	8.7
Maple-birch	497.9	--	--	8.9	51.4	113.5	104.1	116.6	81.1	22.3
Aspen	85.7	--	--	2.7	11.5	2.8	8.2	33.1	19.4	8.0
Paper birch	54.4	--	--	--	--	13.8	10.5	13.5	10.5	6.1
Exotic	--	--	--	--	--	--	--	--	--	--
Nonstocked	33.3	--	--	5.5	2.5	5.5	5.7	8.6	2.8	2.7
All types	1,920.0	--	--	58.0	224.7	444.0	442.3	428.1	230.7	92.2

Table 13.--Area of commercial forest land by forest type, stand-size class, and basal-area class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	5.9	--	--	--	--	--	--	--	--	2.6	--	--	3.3	--	--
Poletimber	2.5	--	--	--	--	--	--	--	--	--	--	--	2.5	--	--
Sapling & seedling	2.8	2.8	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	11.2	2.8	--	--	--	--	--	--	--	2.6	--	--	5.8	--	--
Red pine															
Sawtimber	3.3	--	--	--	--	--	--	--	--	--	--	--	--	3.3	--
Poletimber	26.2	--	--	--	--	--	--	--	2.6	7.7	--	--	5.4	2.7	7.8
Sapling & seedling	10.6	2.6	2.4	--	--	--	5.6	--	--	--	--	--	--	--	--
All stands	40.1	2.6	2.4	--	--	--	5.6	--	2.6	7.7	--	--	5.4	6.0	7.8
White pine															
Sawtimber	3.4	--	--	--	3.4	--	--	--	--	--	--	--	--	--	--
Poletimber	2.6	--	--	--	--	--	--	--	--	--	--	2.6	--	--	--
Sapling & seedling	7.7	2.6	5.1	--	--	--	--	--	--	--	--	--	--	--	--
All stands	13.7	2.6	5.1	--	3.4	--	--	--	--	--	--	2.6	--	--	--
Balsam fir															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	2.5	2.5	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	2.5	2.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(Table 13 continued on next page)

(Table 13 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oak-hickory															
Sawtimber	732.6	--	--	[illegible]	10.7	[illegible]	44.3	86.8	[illegible]	112.1	33.6	[illegible]	101.7	30.2	2.6
Poletimber	137.7	--	--	--	[illegible]	[illegible]	11.8	19.9	19.4	27.6	[illegible]	[illegible]	19.6	[illegible]	[illegible]
Sapling & seedling	145.1	[illegible]	10.8	21.3	[illegible]	10.8	[illegible]	10.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--
All stands	1,065.4	[illegible]	10.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	35.5	[illegible]
Elm-ash-soft maple															
Sawtimber	[illegible]	--	--	--	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--
Poletimber	[illegible]	--	--	--	--	--	[illegible]	--	[illegible]	--	--	[illegible]	--	--	--
Sapling & seedling	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	[illegible]	--	--
All stands	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--
Maple-birch															
Sawtimber	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--
Poletimber	[illegible]	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--
Sapling & seedling	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	--	--
All stands	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--
Aspen															
Sawtimber	[illegible]	--	--	--	--	--	2.8	--	[illegible]	[illegible]	--	[illegible]	[illegible]	--	--
Poletimber	[illegible]	--	[illegible]	--	--	[illegible]	5.3	[illegible]	5.4	--	[illegible]	[illegible]	[illegible]	--	--
Sapling & seedling	[illegible]	[illegible]	--	--	[illegible]	[illegible]	2.8	--	--	--	--	--	--	--	--
All stands	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]	[illegible]	[illegible]	--	--
Paper birch															
Sawtimber	[illegible]	--	--	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	--	--	--	--	[illegible]
Poletimber	[illegible]	--	--	--	--	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--
Sapling & seedling	[illegible]	--	--	--	[illegible]	--	--	[illegible]	--	--	--	--	--	--	--
All stands	[illegible]	--	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	[illegible]
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	33.3	[illegible]	--	[illegible]	--	--	[illegible]	[illegible]	[illegible]	--	--	[illegible]	--	--	--
All types															
Sawtimber	[illegible]	--	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Poletimber	[illegible]	--	[illegible]	--	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sapling & seedling	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	--	--
Nonstocked	33.3	[illegible]	--	[illegible]	--	--	[illegible]	[illegible]	[illegible]	--	--	[illegible]	--	--	--
All stands	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 14.--Area of commercial forest land by stocking class of growing-stock trees and stand-size class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Stocking class (percent)	All stands	Stand-size class			
		Sawtimber stands	Poletimber stands	Sapling and seedling stands	Nonstocked areas
Less than 16.7	33.3	--	--	--	33.3
16.7 to 60.9	592.9	347.1	101.4	144.4	--
61.0 to 100.9	920.4	514.6	218.5	187.3	--
101.0 to 133.9	342.6	197.8	88.6	56.2	--
134.0+	30.8	14.9	13.4	2.5	--
All classes	1,920.0	1,074.4	421.9	390.4	33.3

Table 15.--Area of commercial forest land in plantations by forest type and stand-age class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	5.1	--	--	--	2.6	2.5	--	--	--	--	--	--	--	--
Red pine	34.8	2.6	10.5	15.8	5.9	--	--	--	--	--	--	--	--	--
White pine	10.3	2.6	7.7	--	--	--	--	--	--	--	--	--	--	--
White spruce	2.5	2.5	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	3.2	3.2	--	--	--	--	--	--	--	--	--	--	--	--
All types	55.9	10.9	18.2	15.8	8.5	2.5	--	--	--	--	--	--	--	--

Table 16.--Area of commercial forest land with conifer understory by forest type and conifer understory species, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All species	Conifer understory species									
		White pine	Red pine	Jack pine	Balsam fir	White spruce	Black spruce	Hemlock	Northern white-cedar	Eastern redcedar	Other softwoods
Jack pine	5.3	2.5	--	2.8	--	--	--	--	--	--	--
Red pine	7.7	2.5	2.6	2.6	--	--	--	--	--	--	--
White pine	7.7	7.7	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
White spruce	2.5	--	--	--	--	2.5	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Oak-hickory	48.9	11.5	2.6	--	--	--	--	--	--	34.8	--
Elm-ash-soft maple	--	--	--	--	--	--	--	--	--	--	--
Maple-birch	26.7	5.9	--	2.6	--	--	--	--	--	18.2	--
Aspen	5.0	2.5	--	--	--	--	--	--	--	2.5	--
Paper birch	2.8	--	--	--	--	--	--	--	--	2.8	--
Exotic	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	5.7	3.2	--	--	--	--	--	--	--	2.5	--
All types	112.3	35.8	5.2	8.0	--	2.5	--	--	--	60.8	--

Table 17.--Area of noncommercial forest land by ownership class, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Ownership class	All areas	Productive-reserved areas	Unproductive areas
National Forest	--	--	--
Miscellaneous federal	7.6	7.6	--
State	21.9	21.9	--
County and municipal	2.6	2.6	--
Indian	--	--	--
Forest industry	--	--	--
Farmer	2.3	2.3	--
Misc. private-corp.	4.4	4.4	--
Misc. private-indiv.	--	--	--
Total	38.8	38.8	--

Table 18.--Area of noncommercial forest land by forest type, Southwest Unit, Wisconsin, 1983

(In thousand acres)

Forest type	All areas	Productive-reserved areas	Unproductive areas
Jack pine	--	--	--
Red pine	--	--	--
White pine	--	--	--
Balsam fir	--	--	--
White spruce	--	--	--
Black spruce	--	--	--
Northern white-cedar	--	--	--
Tamarack	--	--	--
Oak-hickory	14.9	14.9	--
Elm-ash-soft maple	13.2	13.2	--
Maple-birch	6.2	6.2	--
Aspen	1.8	1.8	--
Paper birch	--	--	--
Exotic	2.7	2.7	--
Nonstocked	--	--	--
All types	38.8	38.8	--

Table 19.--Number of all live trees on commercial forest land by species group and diameter class, Southwest Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	3,482	1,026	998	568	483	239	88	59	21	--	--	--	--	--	--
Red pine	19,474	4,065	2,317	7,482	4,568	773	204	35	8	6	11	5	--	--	--
White pine	10,556	5,633	2,912	961	615	104	210	23	24	16	13	13	32	--	--
White spruce	1,682	1,076	538	42	26	--	--	--	--	--	--	--	--	--	--
Black spruce	271	--	--	243	28	--	--	--	--	--	--	--	--	--	--
Balsam fir	22	--	--	--	22	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	5,384	4,132	301	747	115	57	21	11	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	40,871	15,932	7,066	10,043	5,857	1,173	523	128	53	22	24	18	32	--	--
Hardwoods															
White oak	66,813	18,689	11,310	9,561	7,475	6,232	5,213	3,260	2,304	1,127	711	411	419	95	6
Select red oak	46,968	14,251	7,339	4,819	3,042	3,913	3,490	3,272	2,539	1,686	1,054	640	773	148	2
Other red oak	29,898	6,540	4,564	3,303	4,291	2,615	2,993	2,060	1,586	922	387	201	366	67	3
Select hickory	38,582	22,336	4,830	4,208	3,246	1,954	1,162	516	236	59	28	4	3	--	--
Other hickory	45,240	28,345	8,134	6,243	1,650	491	271	61	19	20	6	--	--	--	--
Basswood	37,310	16,664	7,996	3,129	3,376	2,446	1,391	916	525	421	170	115	122	31	8
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	131	--	--	--	27	62	--	31	11	--	--	--	--	--	--
Hard maple	47,453	29,730	6,367	4,078	2,044	1,432	1,103	919	612	473	271	130	232	61	1
Soft maple	44,929	27,021	6,882	4,833	2,359	1,350	955	538	369	257	123	90	93	53	6
Elm	96,430	72,415	8,861	5,564	3,591	2,752	1,561	804	491	179	64	41	75	30	2
Black ash	6,969	3,584	1,406	829	508	305	201	44	53	17	18	--	4	--	--
White & green ash	29,317	21,240	2,954	1,883	1,273	762	449	321	260	110	11	16	38	--	--
Cottonwood	1,677	522	--	609	86	59	139	65	24	59	45	17	25	24	3
Willow	2,864	1,320	813	124	175	165	123	64	31	27	--	9	10	3	--
Hackberry	4,741	4,373	--	187	123	--	38	20	--	--	--	--	--	--	--
Balsam poplar	863	807	--	--	--	--	--	41	15	--	--	--	--	--	--
Bigtooth aspen	19,616	8,650	2,924	2,354	1,761	1,346	1,458	581	338	171	19	14	--	--	--
Quaking aspen	35,893	18,108	4,839	6,388	2,992	1,792	1,174	415	126	45	14	--	--	--	--
Paper birch	42,114	16,440	11,064	4,989	5,248	2,631	1,021	474	180	36	28	--	3	--	--
River birch	2,237	516	817	489	168	74	64	48	39	--	17	5	--	--	--
Black cherry	39,732	26,412	4,636	3,654	1,998	2,063	472	354	97	41	--	5	--	--	--
Black walnut	2,199	558	--	277	378	367	317	168	59	44	12	16	3	--	--
Butternut	8,305	3,657	554	1,200	1,295	658	428	248	200	32	12	10	9	2	--
Other hardwoods	26,798	17,035	5,043	2,339	1,109	368	457	258	107	36	22	4	20	--	--
Noncommercial species	136,065	99,309	27,609	7,524	1,425	121	52	25	--	--	--	--	--	--	--
Total	813,144	458,522	128,942	78,584	49,640	33,958	24,532	15,503	10,221	5,762	3,012	1,728	2,195	514	31
All species	854,015	474,454	136,008	88,627	55,497	35,131	25,055	15,631	10,274	5,784	3,036	1,746	2,227	514	31

Table 20.--Number of growing-stock trees on commercial forest land by species group and diameter class, Southwest Unit, Wisconsin, 1983

(In thousand trees)

Species group	All classes	Diameter class (inches at breast height) 1.0-2.9	3.0-4.9	5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods															
Jack pine	3,082	1,026	998	322	449	203	40	44	--	--	--	--	--	--	--
Red pine	19,316	4,065	2,317	7,408	4,484	773	204	35	8	6	11	5	--	--	--
White pine	10,108	5,373	2,912	892	496	104	210	23	24	16	13	13	32	--	--
White spruce	1,682	1,076	538	42	26	--	--	--	--	--	--	--	--	--	--
Black spruce	271	--	--	243	28	--	--	--	--	--	--	--	--	--	--
Balsam fir	22	--	--	--	22	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	3,611	2,992	--	593	--	15	--	11	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	38,092	14,532	6,765	9,500	5,505	1,095	454	113	32	22	24	18	32	--	--
Hardwoods															
White oak	52,588	18,162	8,086	7,262	5,263	4,340	3,917	2,238	1,590	772	449	252	219	34	4
Select red oak	41,227	13,681	6,536	4,122	2,673	2,943	2,923	2,808	2,076	1,496	847	479	569	72	2
Other red oak	22,978	6,540	3,660	2,221	3,446	1,573	1,950	1,360	1,088	542	259	119	191	29	--
Select hickory	35,669	22,090	4,235	3,400	2,778	1,486	988	437	169	61	28	4	3	--	--
Other hickory	43,844	28,345	7,261	6,105	1,344	470	223	61	11	20	6	--	--	--	--
Basswood	33,678	16,383	6,868	2,355	3,079	2,095	1,246	718	400	252	131	68	61	19	3
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	121	--	--	--	27	62	--	21	11	--	--	--	--	--	--
Hard maple	44,299	28,893	6,845	3,947	1,777	1,095	805	659	474	298	169	82	130	34	1
Soft maple	42,332	27,021	6,059	4,376	2,046	1,049	710	426	215	131	94	59	61	29	4
Elm	90,540	70,825	8,288	3,960	2,851	2,326	1,196	534	304	133	74	19	58	21	1
Black ash	6,785	3,584	1,406	829	451	221	132	28	53	17	10	--	4	--	--
White & green ash	27,996	20,682	2,678	1,853	1,095	683	435	266	202	80	6	16	23	--	--
Cottonwood	1,385	522	--	329	86	59	139	65	24	59	45	17	14	24	2
Willow	2,214	1,059	552	124	127	165	109	32	11	27	--	5	3	--	--
Hackberry	4,682	4,373	--	187	64	--	--	38	20	--	--	--	--	--	--
Balsam poplar	863	807	--	--	--	--	--	41	15	--	--	--	--	--	--
Bigtooth aspen	19,261	8,656	2,924	2,247	1,731	1,331	1,378	552	307	113	19	9	--	--	--
Quaking aspen	33,324	17,847	4,570	5,330	2,572	1,881	1,052	303	96	29	24	--	--	--	--
Paper birch	39,934	16,180	10,804	4,947	4,548	1,104	425	334	139	28	5	--	--	--	--
River birch	2,178	516	817	489	165	74	46	51	27	--	5	5	--	--	--
Black cherry	34,916	25,092	3,572	2,421	1,463	1,739	865	186	40	41	--	--	--	--	--
Black walnut	1,841	558	--	161	329	283	274	168	23	20	12	11	3	--	--
Butternut	5,752	5,049	554	538	695	391	240	140	101	6	--	--	6	2	--
Other hardwoods	21,475	14,580	4,451	1,136	345	163	124	93	--	6	22	--	--	--	--
Total	609,852	419,190	96,173	58,411	39,342	26,165	19,263	11,521	7,346	4,180	2,145	1,145	1,549	314	29
All species	647,944	433,722	102,938	67,911	44,847	27,260	19,717	11,634	7,378	4,202	2,169	1,163	1,581	314	29

Table 21.--Net volume of growing stock on commercial forest land by species group, Southwest Unit, Wisconsin, 1968 and 1983

(In thousand cubic feet)

Species group	1968	1983
Softwoods		
Jack pine	5,000	7,060
Red pine	7,400	67,514
White pine	8,800	14,305
White spruce	--	310
Black spruce	--	914
Balsam fir	--	194
Hemlock	--	--
Tamarack	100	--
Eastern redcedar	--	1,479
Northern white-cedar	--	--
Other softwoods	200	--
Total	21,500	91,776
Hardwoods		
White oak	161,500	278,311
Select red oak	308,000	403,571
Other red oak	122,200	175,245
Select hickory	46,300	74,011
Other hickory	17,300	40,083
Basswood	62,200	124,839
Beech	--	--
Yellow birch	1,000	1,263
Hard maple	65,400	116,869
Soft maple	65,800	91,605
Elm	112,500	88,963
Black ash	8,900	14,133
White and green ash	22,900	44,283
Cottonwood	9,800	18,288
Willow	4,700	6,822
Hackberry	700	1,635
Balsam poplar	300	1,466
Bigtooth aspen	70,000	87,754
Quaking aspen	66,100	79,237
Paper birch	38,800	91,251
River birch	5,100	5,940
Black cherry	13,100	47,829
Black walnut	4,900	16,233
Butternut	7,900	21,628
Other hardwoods	3,200	12,636
Total	1,218,600	1,843,895
All species	1,240,100	1,935,671

Table 22.--Net volume of all live trees on commercial forest land by species group and diameter class, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	9,448	1,470	2,677	2,287	1,338	1,193	483	--	--	--	--	--	--
Red pine	68,175	27,766	27,585	7,553	2,907	853	294	296	606	315	--	--	--
White pine	14,713	1,563	2,111	963	2,865	546	917	704	830	881	3,333	--	--
White spruce	310	135	175	--	--	--	--	--	--	--	--	--	--
Black spruce	914	722	192	--	--	--	--	--	--	--	--	--	--
Balsam fir	194	--	194	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	2,668	1,419	455	438	196	160	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	96,422	33,075	33,389	11,241	7,306	2,752	1,694	1,000	1,436	1,196	3,333	--	--
Hardwoods													
White oak	389,068	19,880	33,161	48,343	63,789	56,246	52,962	34,223	26,691	18,702	25,190	8,815	1,066
Select red oak	474,928	15,595	18,012	36,907	50,911	68,558	70,196	61,257	47,689	34,246	54,864	16,151	542
Other red oak	257,885	7,367	21,463	23,117	40,199	37,943	40,787	29,885	16,701	10,022	24,000	6,110	291
Select hickory	87,606	15,039	19,041	17,745	16,031	10,010	6,227	1,920	1,184	212	197	--	--
Other hickory	42,929	22,301	9,676	4,637	3,709	1,269	379	705	253	--	--	--	--
Basswood	150,465	8,304	19,328	24,376	21,527	19,833	15,438	13,998	7,671	6,147	7,930	3,750	2,163
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	1,468	--	113	442	--	632	281	--	--	--	--	--	--
Hard maple	149,877	11,723	12,157	13,907	16,266	19,117	17,804	16,742	11,877	7,165	16,035	6,792	292
Soft maple	114,508	15,470	14,276	13,572	14,064	11,487	9,805	9,555	6,129	4,929	7,106	6,730	1,385
Elm	118,225	7,651	15,168	22,490	21,359	16,124	13,183	6,604	2,801	2,225	5,891	4,316	413
Black ash	15,835	3,225	3,040	2,996	2,800	823	1,420	614	718	--	199	--	--
White & green ash	50,255	5,563	7,269	8,357	6,966	6,767	7,404	3,933	606	924	2,466	--	--
Cottonwood	19,526	608	476	554	2,309	1,515	738	2,612	2,562	1,084	2,037	3,844	1,187
Willow	9,828	133	770	1,520	1,828	1,259	813	1,173	--	405	1,108	819	--
Hackberry	1,844	269	465	--	581	529	--	--	--	--	--	--	--
Balsam poplar	1,466	--	--	--	--	1,047	419	--	--	--	--	--	--
Bigtooth aspen	91,861	6,601	11,656	15,099	25,115	14,093	10,962	6,279	1,101	955	--	--	--
Quaking aspen	88,871	21,600	18,096	17,708	17,622	7,970	3,497	1,627	751	--	--	--	--
Paper birch	106,429	19,672	32,179	24,835	14,155	8,839	4,434	1,239	1,004	--	72	--	--
River birch	7,088	1,191	930	800	1,105	786	1,257	--	676	343	--	--	--
Black cherry	63,769	13,627	12,415	20,217	6,809	6,667	2,363	1,456	--	215	--	--	--
Black walnut	19,420	944	2,362	4,008	4,287	3,510	1,317	1,472	527	732	241	--	--
Butternut	35,561	3,690	3,494	6,278	5,933	4,534	5,060	1,040	372	333	578	249	--
Other hardwoods	26,895	5,856	5,402	2,511	4,429	3,937	2,031	937	657	138	997	--	--
Noncommercial species	21,295	14,281	5,194	839	616	365	--	--	--	--	--	--	--
Total	2,346,902	220,590	270,163	311,258	342,410	303,860	266,777	197,271	129,970	88,777	148,911	57,576	7,339
All species	2,443,324	253,665	303,552	322,499	349,716	306,612	270,471	198,271	131,406	89,973	152,244	57,576	7,339

Table 23.--Net volume of timber on commercial forest land by class of timber and softwoods and hardwoods, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Class of timber	All species	Softwoods	Hardwoods
Live trees			
Growing-stock trees			
Poletimber	717,804	63,898	653,906
Sawtimber			
Saw log portion	819,296	21,419	797,877
Upper stem portion	398,571	6,459	392,112
Subtotal	1,217,867	27,878	1,189,989
Total growing stock	1,935,671	91,776	1,843,895
Cull trees			
Rough and rotten cull trees			
Poletimber	151,498	2,566	148,932
Sawtimber	232,722	1,910	230,812
Subtotal	384,220	4,476	379,744
Short-log trees	123,433	170	123,263
Total cull	507,653	4,646	503,007
All live trees	2,443,324	96,422	2,346,902
Salvable dead trees			
Growing-stock trees	32,932	593	32,339
Cull trees	2,269	--	2,269
All salvable dead trees	35,201	593	34,608
	2,478,525	97,015	2,381,510

Table 24.--Net volume of all live trees by individual species, Southwest Unit, Wisconsin, 1983

Species	All live trees					Saw-log size trees	
	Total all live	Growing stock	Short-log cull	Rough and rotten cull	Total saw log	Sawtimber	Short-log
	Thousand cubic feet				Thousand board [1/]		
Softwoods							
Jack pine	9,448	7,060	170	2,218	19,614	19,028	586
Red pine	68,175	67,514	--	661	73,260	73,260	--
White pine	14,713	14,305	--	408	57,982	57,982	--
White spruce	310	310	--	--	--	--	--
Black spruce	914	914	--	--	--	--	--
Balsam fir	194	194	--	--	--	--	--
Eastern redcedar	2,668	1,479	--	1,189	1,837	1,837	--
Total	96,422	91,776	170	4,476	152,693	152,107	586
Hardwoods							
White oak	295,360	217,976	25,563	51,819	892,790	825,634	67,156
Swamp white oak	9,343	8,125	410	808	29,938	28,902	1,036
Bur oak	84,365	52,208	6,671	25,486	201,068	183,119	17,949
Northern red oak	474,928	403,571	24,646	46,711	1,754,830	1,698,953	55,877
Northern pin oak	114,828	68,526	8,803	37,499	255,117	235,070	20,047
Black oak	143,057	106,719	12,131	24,207	449,917	422,350	27,567
Shagbark hickory	87,606	74,011	1,724	11,871	166,277	161,696	4,581
Bitternut hickory	42,851	40,083	246	2,522	30,583	29,895	688
Pignut hickory	78	--	--	78	--	--	--
American basswood	150,465	124,839	5,076	20,550	398,246	387,042	11,204
Yellow birch	1,468	1,263	--	205	3,262	3,262	--
Black maple	1,502	1,309	193	--	7,129	6,619	510
Sugar maple	148,375	115,560	9,745	23,070	442,700	418,442	24,258
Red maple	50,702	39,969	2,761	7,972	98,548	91,082	7,466
Silver maple	63,806	51,636	2,888	9,282	182,164	174,720	7,444
American elm	81,790	58,366	7,491	15,933	165,302	146,220	19,082
Slippery elm	35,376	29,538	1,077	4,761	81,456	78,721	2,735
Rock elm	1,059	1,059	--	--	3,937	3,937	--
Black ash	15,835	14,133	257	1,445	31,624	30,886	738
White ash	40,499	[illegible]	1,789	3,127	104,998	100,899	[illegible]
Green ash	9,756	[illegible]	231	825	30,599	30,101	498
Eastern cottonwood	19,526	18,288	734	504	76,434	73,983	2,451
Black willow	9,828	6,822	788	2,218	21,673	19,288	2,385
Hackberry	1,844	1,635	--	209	4,632	4,632	--
Balsam poplar	1,466	1,466	--	--	6,428	6,428	--
Bigtooth aspen	91,861	87,754	1,719	2,388	253,397	250,507	2,890
Quaking aspen	88,871	79,237	--	9,634	136,605	136,605	--
Paper birch	106,429	91,251	2,161	13,017	121,007	115,121	5,886
River birch	7,088	5,940	645	503	16,050	13,929	2,121
Black cherry	63,769	47,829	1,647	14,293	70,654	66,409	4,245
Black walnut	19,420	16,233	478	2,709	60,946	59,651	1,295
Butternut	35,561	21,628	1,990	11,943	66,191	60,829	5,362
Boxelder	21,619	8,343	1,399	11,877	18,574	13,546	5,028
Honeylocust	1,193	1,128	--	65	2,535	2,535	--
Black locust	4,083	3,165	--	918	5,993	5,993	--
Total	2,325,607	1,843,895	123,263	358,449	6,191,604	5,887,006	304,598
All species [2/]	2,422,029	1,935,671	123,433	362,925	6,344,297	6,039,113	305,184

[1/] International 1/4-inch rule.

[2/] These totals do not include volume for noncommercial species. Volumes for individual noncommercial species are found in Table 25.

Table 25.--Net volume of noncommercial species on commercial forest land by individual species, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species	Cull volume
Apple	1,104
Eastern hophornbeam	19,145
Pincherry	1,046
All species	21,295

Table 26.--Net volume of growing stock on commercial forest land by species group and county, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All counties	County							
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin
Softwoods									
Jack pine	7,060	--	--	2,578	--	--	3,596	--	--
Red pine	67,514	5,415	--	24,472	--	191	6,281	--	--
White pine	14,305	--	--	1,634	1,082	2,663	2,496	--	168
White spruce	310	--	--	--	--	--	--	--	--
Black spruce	914	--	--	--	--	--	--	--	--
Balsam fir	194	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--
Eastern redcedar	1,479	--	--	--	259	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--
Total	91,776	5,415	--	28,684	1,341	2,854	12,373	--	168
Hardwoods									
White oak	278,311	22,624	24,513	25,775	41,746	23,203	15,884	11,487	3,382
Select red oak	403,571	54,034	40,838	36,716	36,821	14,001	37,183	1,896	10,063
Other red oak	175,245	31,029	14,009	10,999	21,539	9,940	13,929	4,126	279
Select hickory	74,011	10,044	11,023	--	4,794	6,322	10,160	355	--
Other hickory	40,083	235	5,627	902	2,335	2,589	992	182	--
Basswood	124,839	5,186	10,993	9,075	12,071	6,308	5,500	3,071	4,227
Beech	--	--	--	--	--	--	--	--	--
Yellow birch	1,263	--	--	842	--	--	--	--	--
Hard maple	116,869	664	11,069	11,473	10,995	3,556	--	--	2,524
Soft maple	91,605	4,938	14,914	15,442	9,385	2,573	4,597	--	5,640
Elm	88,963	7,385	9,674	5,147	12,540	6,839	4,913	2,203	2,134
Black ash	14,133	--	1,835	3,016	1,129	2,171	775	--	1,421
White & green ash	44,283	2,928	6,309	5,274	2,843	2,200	--	1,075	1,800
Sycamore	18,288	2,377	279	320	759	1,204	3,237	--	1,357
Cottonwood	6,822	--	1,485	499	--	430	618	--	1,558
Willow	1,635	78	--	--	130	--	110	--	--
Hackberry	1,466	419	--	--	--	--	--	--	--
Balsam poplar	87,754	17,395	7,610	14,380	2,592	3,036	6,159	--	3,813
Bigtooth aspen	79,237	17,908	1,629	9,036	6,163	4,948	4,989	1,131	1,800
Quaking aspen	91,251	24,350	5,405	8,389	3,534	3,208	8,463	--	2,774
Paper birch	5,940	514	600	--	2,352	1,084	968	--	422
Black cherry	47,829	9,598	1,244	1,540	1,326	3,781	3,558	2,730	368
Black walnut	16,233	--	3,533	262	5,813	3,207	--	635	--
Butternut	21,628	1,110	1,628	1,357	2,094	948	1,863	--	513
Other hardwoods	12,636	3,839	470	--	458	1,727	761	--	454
Total	1,843,895	216,655	174,687	160,444	181,419	103,275	124,659	28,891	44,529
All species	1,935,671	222,070	174,687	189,128	182,760	106,129	137,032	28,891	44,697

(Table 26 continued on next page)

Erratum-- Please insert this corrected Table 26 on page 36 of Resource Bulletin NC-87

Table 26.--Net volume of growing stock on commercial forest land by species group and county, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All counties	County							
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin
Softwoods									
Jack pine	7,060	--	--	2,578	--	--	3,596	--	--
Red pine	67,514	5,415	--	24,472	--	191	6,281	--	--
White pine	14,305	--	--	1,634	1,082	2,663	2,496	--	168
White spruce	310	--	--	--	--	--	--	--	--
Black spruce	914	--	--	--	--	--	--	--	--
Balsam fir	194	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--
Eastern redcedar	1,479	--	--	--	259	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--
Total	91,776	5,415	--	28,684	1,341	2,854	12,373	--	168
Hardwoods									
White oak	278,311	22,624	24,513	25,775	41,746	23,203	15,884	11,487	3,382
Select red oak	403,571	54,034	40,838	36,716	36,821	14,001	37,183	1,896	10,063
Other red oak	175,245	31,029	14,009	10,999	21,539	9,940	13,929	4,126	279
Select hickory	74,011	10,044	11,023	--	4,794	6,322	10,160	355	--
Other hickory	40,083	235	5,627	902	2,335	2,589	992	182	--
Basswood	124,839	5,186	10,993	9,075	12,071	6,308	5,500	3,071	4,227
Beech	--	--	--	--	--	--	--	--	--
Yellow birch	1,263	--	--	842	--	--	--	--	--
Hard maple	116,869	664	11,069	11,473	10,995	3,556	--	--	2,524
Soft maple	91,605	4,938	14,914	15,442	9,385	2,573	4,597	--	5,640
Elm	88,963	7,385	9,674	5,147	12,540	6,839	4,913	2,203	2,134
Black ash	14,133	--	1,835	3,016	1,129	2,171	775	--	1,421
White & green ash	44,283	2,928	6,309	5,274	2,843	2,200	--	1,075	1,800
Cottonwood	18,288	2,377	279	320	759	1,204	3,237	--	1,357
Willow	6,822	--	1,485	499	--	430	618	--	1,558
Hackberry	1,635	78	--	--	130	--	110	--	--
Balsam poplar	1,466	419	--	--	--	--	--	--	--
Bigtooth aspen	87,754	17,395	7,610	14,380	2,592	3,036	6,159	--	3,813
Quaking aspen	79,237	17,908	1,629	9,036	6,163	4,948	4,989	1,131	1,800
Paper birch	91,251	24,350	5,405	8,389	3,534	3,208	8,463	--	2,774
River birch	5,940	514	600	--	2,352	1,084	968	--	422
Black cherry	47,829	9,598	1,244	1,540	1,326	3,781	3,558	2,730	368
Black walnut	16,233	--	3,533	262	5,813	3,207	--	635	--
Butternut	21,628	1,110	1,628	1,357	2,094	948	1,863	--	513
Other hardwoods	12,636	3,839	470	--	458	1,727	761	--	454
Total	1,843,895	216,655	174,687	160,444	181,419	103,275	124,659	28,891	44,529
All species	1,935,671	222,070	174,687	189,128	182,760	106,129	137,032	28,891	44,697

(Table 26 continued on next page)

(Table 26 continued)

Species group	County					
	Pierce	Richland	St. Croix	Sauk	Trempealeau	Vernon
Softwoods						
Jack pine	--	--	--	886	--	--
Red pine	3,331	--	7,475	7,442	12,907	--
White pine	--	--	--	2,690	2,247	1,325
White spruce	--	--	310	--	--	--
Black spruce	--	--	--	914	--	--
Balsam fir	--	--	--	194	--	--
Hemlock	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--
Eastern redcedar	--	--	--	160	1,060	--
Northern white-cedar	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--
Total	3,331	--	7,785	12,286	16,214	1,325
Hardwoods						
White oak	5,356	18,557	3,920	26,652	16,599	38,613
Select red oak	11,476	18,431	5,889	51,839	26,656	57,728
Other red oak	3,217	6,403	3,305	14,126	28,272	14,072
Select hickory	--	8,027	--	7,582	3,739	11,965
Other hickory	2,475	12,855	151	5,253	1,348	5,139
Basswood	9,698	14,916	2,734	12,260	2,907	25,893
Beech	--	--	--	--	--	--
Yellow birch	--	--	--	421	--	--
Hard maple	22,926	27,209	--	4,770	--	21,683
Soft maple	--	7,317	--	19,834	4,556	2,409
Elm	5,002	12,118	1,033	6,457	2,255	11,263
Black ash	--	548	2,555	162	--	521
White & green ash	3,104	6,648	2,732	2,974	193	6,203
Cottonwood	2,131	2,088	188	--	1,946	2,402
Willow	--	184	--	--	2,048	--
Hackberry	--	1,110	--	126	--	81
Balsam poplar	--	--	--	--	1,047	--
Bigtooth aspen	1,885	7,187	3,174	14,002	5,357	1,164
Quaking aspen	3,490	1,499	13,651	7,980	2,399	2,614
Paper birch	3,111	4,096	6,070	1,860	16,760	3,231
River birch	--	--	--	--	--	--
Black cherry	2,618	2,903	--	5,890	6,340	5,933
Black walnut	--	423	--	--	--	2,360
Butternut	2,959	4,851	253	579	--	3,473
Other hardwoods	1,445	1,269	1,496	--	542	175
Total	80,893	158,639	47,151	182,767	122,964	216,922
All species	84,224	158,639	54,936	195,053	139,178	218,247

Table 27.--Net volume of sawtimber on commercial forest land by species group and county, Southwest Unit, Wisconsin, 1983

(In thousand board feet [1/])

Species group	All counties	County							
		Buffalo	Crawford	Dunn	[illegible]	Iowa	La Crosse	Lafayette	Pepin
Softwoods									
Jack pine	19,028	--	--	5,163	--	--	13,865	--	--
Red pine	73,260	2,993	--	19,251	--	--	30,121	--	--
White pine	57,982	--	--	7,207	[illegible]	14,234	14,283	--	654
White spruce	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--
[illegible]	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--
Eastern redcedar	1,837	--	--	--	943	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--
Total	152,107	2,993	--	31,621	7,241	14,234	58,269	--	654
Hardwoods									
White oak	1,037,655	86,854	83,487	85,681	153,370	100,576	57,807	54,125	10,961
Select red oak	1,698,953	206,157	176,224	149,716	164,905	57,240	160,386	8,956	37,803
Other red oak	657,420	124,988	45,740	26,077	79,005	37,232	50,751	17,879	1,294
Select hickory	161,696	21,850	11,279	--	14,301	18,836	21,376	976	--
Other hickory	29,895	1,202	5,698	--	4,980	1,071	3,800	--	--
Basswood	387,042	11,516	28,736	30,418	39,368	16,282	13,225	8,483	15,479
Beech	--	--	--	--	--	--	--	--	--
Yellow birch	3,262	--	--	2,503	--	--	--	--	--
Hard maple	425,061	1,574	31,952	30,957	44,562	9,831	--	--	10,300
Soft maple	265,802	23,294	43,192	44,149	40,561	5,771	8,519	--	19,966
Elm	228,878	17,552	24,251	13,837	39,889	17,697	11,122	6,170	6,873
Black ash	30,886	--	1,137	5,688	4,908	--	1,710	--	4,227
White & green ash	131,000	9,678	21,499	21,057	11,165	3,617	--	4,516	4,986
Cottonwood	73,983	8,538	1,268	1,437	3,225	5,366	13,767	--	3,892
[illegible]	19,288	--	4,545	2,063	--	1,022	--	--	6,783
Hackberry	4,632	--	--	--	--	--	--	--	--
Balsam poplar	6,428	1,945	--	--	--	--	--	--	--
Bigtooth aspen	250,507	54,638	13,125	47,951	7,521	7,101	17,109	--	15,083
Quaking aspen	136,605	49,376	3,590	6,797	1,070	--	5,823	1,149	3,188
Paper birch	115,121	28,368	14,409	12,395	4,526	6,060	6,595	--	1,912
River birch	13,929	970	2,726	--	1,606	2,202	4,430	--	1,995
Black cherry	66,409	15,182	--	1,948	1,634	6,957	6,816	3,408	--
Black walnut	59,651	--	10,643	--	25,426	10,696	--	--	--
Butternut	60,829	1,611	7,198	5,939	--	2,852	7,402	--	1,612
Other hardwoods	22,074	2,455	881	--	2,622	2,460	3,128	--	1,325
Total	5,887,006	667,748	531,580	488,613	644,644	312,869	393,766	105,662	147,679
All species	6,039,113	670,741	531,580	520,234	651,885	327,103	452,035	105,662	148,333

(Table 27 continued on next page)

[1/] International 1/4-inch rule.

(Table 27 continued)

Species group	County					
	Pierce	Richland	St. Croix	Sauk	Trempealeau	Vernon
Softwoods						
Jack pine	--	--	--	--	--	--
Red pine	13,479	--	3,243	4,173	--	--
White pine	--	--	--	10,553	--	4,753
White spruce	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--
Eastern redcedar	--	--	--	894	--	--
Northern white-cedar	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--
Total	13,479	--	3,243	15,620	--	4,753
Hardwoods						
White oak	16,525	63,188	6,233	105,801	60,998	152,049
Select red oak	47,333	75,642	18,646	210,438	114,963	270,544
Other red oak	14,799	27,004	10,606	58,479	104,459	59,107
Select hickory	--	24,747	--	12,496	1,018	34,817
Other hickory	5,371	2,406	--	1,975	--	3,392
Basswood	34,615	54,653	9,999	34,883	4,647	84,738
Beech	--	--	--	--	--	--
Yellow birch	--	--	--	759	--	--
Hard maple	88,301	111,002	--	12,693	--	83,889
Soft maple	--	22,511	--	33,827	17,556	6,456
Elm	13,704	32,325	3,283	9,005	4,966	28,204
Black ash	--	--	10,437	953	--	1,826
White & green ash	6,508	26,474	1,074	5,476	1,057	13,893
Cottonwood	8,205	9,505	819	--	8,021	9,940
Willow	--	819	--	--	4,056	--
Hackberry	--	4,632	--	--	--	--
Balsam poplar	--	--	--	--	4,483	--
Bigtooth aspen	6,636	21,226	11,528	31,448	15,619	--
Quaking aspen	3,423	4,730	30,845	18,473	8,141	--
Paper birch	4,917	1,610	5,773	1,183	27,373	--
River birch	--	--	--	--	--	--
Black cherry	1,324	2,906	--	6,732	13,130	6,372
Black walnut	--	--	--	--	--	12,886
Butternut	8,119	8,302	--	3,507	--	14,287
Other hardwoods	5,757	2,560	886	--	--	--
Total	265,537	496,242	110,129	548,128	390,487	783,922
All species	279,016	496,242	113,372	563,748	390,487	788,675

Table 28.--Net volume of growing stock on commercial forest land by species group and diameter class, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 5.0-6.9	7.0-8.9	9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods													
Jack pine	7,060	776	2,589	2,064	685	946	--	--	--	--	--	--	--
Red pine	67,514	27,583	27,107	7,553	2,907	853	294	296	606	315	--	--	--
White pine	14,305	1,513	1,753	963	2,865	546	917	704	830	881	3,333	--	--
White spruce	310	135	175	--	--	--	--	--	--	--	--	--	--
Black spruce	914	722	192	--	--	--	--	--	--	--	--	--	--
Balsam fir	194	--	194	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	1,479	1,159	--	160	--	160	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	91,776	31,888	32,010	10,740	6,457	2,505	1,211	1,000	1,436	1,196	3,333	--	--
Hardwoods													
White oak	278,311	15,465	24,709	35,419	49,617	40,148	38,308	24,603	18,273	12,244	14,871	3,872	782
Select red oak	403,571	13,515	16,128	29,498	44,088	60,669	60,167	56,556	40,948	27,863	44,387	9,210	542
Other red oak	175,245	5,128	17,572	14,641	27,490	27,008	29,280	19,141	11,454	6,336	14,114	3,081	--
Select hickory	74,011	12,600	16,774	13,988	13,906	8,738	4,716	1,696	1,184	212	197	--	--
Other hickory	40,083	21,929	8,032	4,417	3,177	1,269	301	705	253	--	--	--	--
Basswood	124,839	6,371	17,701	21,447	19,680	16,516	12,885	10,457	6,464	4,529	4,922	3,004	863
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	1,263	--	113	442	--	427	281	--	--	--	--	--	--
Hard maple	116,869	11,266	10,933	11,185	13,647	14,784	14,472	11,531	8,272	5,150	10,785	4,552	292
Soft maple	91,605	14,207	12,472	11,189	11,118	9,397	6,440	7,242	4,888	3,623	5,521	4,384	1,124
Elm	88,963	5,492	12,083	19,569	16,782	11,129	8,464	5,029	1,157	1,146	4,761	3,050	301
Black ash	14,133	3,225	2,761	2,330	2,577	566	1,420	614	441	--	199	--	--
White & green ash	44,283	5,412	6,256	7,565	6,751	6,018	6,094	3,166	373	924	1,724	--	--
Cottonwood	18,288	400	476	554	2,309	1,515	738	2,612	2,562	1,084	1,268	3,844	926
Willow	6,822	133	625	1,520	1,634	688	407	1,173	--	314	328	--	--
Hackberry	1,635	269	256	--	581	529	--	--	--	--	--	--	--
Balsam poplar	1,466	--	--	--	--	1,047	419	--	--	--	--	--	--
Bigtooth aspen	87,754	6,474	11,583	14,984	24,301	13,556	10,317	4,750	1,101	688	--	--	--
Quaking aspen	79,237	18,683	16,239	16,114	16,543	6,837	2,966	1,104	751	--	--	--	--
Paper birch	91,251	19,503	28,409	20,839	11,841	6,504	2,903	1,022	230	--	--	--	--
River birch	5,940	1,191	930	800	810	675	892	--	299	343	--	--	--
Black cherry	47,829	9,564	9,038	17,417	5,556	3,724	1,074	1,456	--	--	--	--	--
Black walnut	16,233	663	1,963	3,276	3,804	3,510	620	972	527	657	241	--	--
Butternut	21,628	1,979	4,784	3,914	3,816	3,114	3,089	318	--	--	365	249	--
Other hardwoods	12,636	3,055	4,348	1,262	1,423	1,641	--	250	657	--	--	--	--
Total	1,843,895	176,524	224,185	252,370	281,451	240,009	206,253	154,397	99,834	65,113	103,683	35,246	4,830
All species	1,935,671	208,412	256,195	263,110	287,908	242,514	207,464	155,397	101,270	66,309	107,016	35,246	4,830

Table 29.--Net volume of sawtimber on commercial forest land by species group and diameter class, Southwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	19,028	10,628	3,518	4,882	--	--	--	--	--	--	--
Red pine	73,260	43,294	16,487	4,827	1,665	1,699	3,470	1,818	--	--	--
White pine	57,982	3,820	13,042	2,738	4,932	3,865	4,670	5,092	19,823	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	1,837	894	--	943	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	152,107	58,636	33,047	13,390	6,597	5,564	8,140	6,910	19,823	--	--
Hardwoods											
White oak	1,037,655	--	273,469	208,102	192,027	120,869	88,754	59,496	72,190	18,912	3,836
Select red oak	1,698,953	--	215,324	293,749	293,285	278,037	202,860	139,495	225,410	47,915	2,878
Other red oak	657,420	--	129,095	127,400	138,233	91,276	55,301	30,794	69,741	15,580	--
Select hickory	161,696	--	77,237	45,054	23,265	8,378	5,770	1,018	974	--	--
Other hickory	29,895	--	17,338	6,469	1,450	3,431	1,207	--	--	--	--
Basswood	387,042	--	94,294	78,923	62,203	51,240	32,209	22,713	25,119	15,695	4,646
Beech	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	3,262	--	--	1,911	1,351	--	--	--	--	--	--
Hard maple	425,061	--	65,559	72,577	72,620	59,016	43,159	27,192	58,064	25,202	1,672
Soft maple	265,802	--	61,952	48,133	31,447	34,340	22,678	16,597	25,307	20,138	5,210
Elm	228,878	--	71,280	48,089	37,323	22,561	5,310	5,291	22,557	14,968	1,499
Black ash	30,886	--	13,434	3,262	7,728	3,162	2,286	--	1,014	--	--
White & green ash	131,000	--	39,339	31,719	30,503	15,306	1,721	4,397	8,015	--	--
Cottonwood	73,983	--	9,527	6,463	3,057	10,986	10,981	4,810	5,728	17,939	4,492
Willow	19,288	--	6,923	2,835	1,651	5,013	--	1,379	1,487	--	--
Hackberry	4,632	--	2,340	2,292	--	--	--	--	--	--	--
Balsam poplar	6,428	--	--	4,483	1,945	--	--	--	--	--	--
Bigtooth aspen	250,507	--	105,922	63,383	49,051	23,267	5,471	3,413	--	--	--
Quaking aspen	136,605	--	76,851	34,023	15,546	6,010	4,175	--	--	--	--
Paper birch	115,121	--	59,150	33,691	15,447	5,546	1,287	--	--	--	--
River birch	13,929	--	3,738	3,136	4,088	--	1,361	1,606	--	--	--
Black cherry	66,409	--	32,589	20,803	5,646	7,371	--	--	--	--	--
Black walnut	59,651	--	23,900	19,937	3,409	5,206	2,705	3,289	1,205	--	--
Butternut	60,829	--	22,730	17,187	16,175	1,654	--	--	1,856	1,227	--
Other hardwoods	22,074	--	7,898	8,999	--	1,405	3,772	--	--	--	--
Total	5,887,006	--	1,409,889	1,182,620	1,007,450	754,074	491,007	321,490	518,667	177,576	24,233
All species	6,039,113	58,636	1,442,936	1,196,010	1,014,047	759,638	499,147	328,400	538,490	177,576	24,233

[1/] International 1/4-inch rule.

Table 30.--Net volume of growing stock on commercial forest land by species group and forest type, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

ies group	All types	Forest type: Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
woods								
ck pine	7,060	5,571	1,250	--	--	--	--	--
d pine	67,514	1,137	56,641	--	--	--	--	--
ite pine	14,305	976	1,478	4,743	--	--	--	--
ite spruce	310	--	310	--	--	--	--	--
lack spruce	914	--	914	--	--	--	--	--
Balsam fir	194	--	194	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	1,479	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	91,776	7,684	60,787	4,743	--	--	--	--
Hardwoods								
White oak	278,311	--	--	--	--	--	--	--
Select red oak	403,571	--	1,072	--	--	--	--	--
Other red oak	175,245	314	507	--	--	--	--	--
Select hickory	74,011	--	--	--	--	--	--	--
Other hickory	40,083	--	--	--	--	--	--	--
Basswood	124,839	--	--	--	--	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	1,263	--	--	--	--	--	--	--
Hard maple	116,869	--	--	--	--	--	--	--
Soft maple	91,605	--	--	--	--	--	--	--
Elm	88,963	307	--	--	--	--	--	--
Black ash	14,133	--	--	--	--	--	--	--
White & green ash	44,283	--	--	--	--	--	--	--
Cottonwood	18,288	--	--	394	--	--	--	--
Willow	6,822	--	--	--	--	--	--	--
Hackberry	1,635	--	--	--	--	--	--	--
Balsam poplar	1,466	--	--	--	--	--	--	--
Bigtooth aspen	87,754	--	--	--	--	--	--	--
Quaking aspen	79,237	343	952	--	--	--	--	--
Paper birch	91,251	--	--	--	--	--	--	--
River birch	5,940	--	--	--	--	--	--	--
Black cherry	47,829	--	224	--	--	--	--	--
Black walnut	16,233	--	--	--	--	--	--	--
Butternut	21,628	--	--	--	--	--	--	--
Other hardwoods	12,636	--	581	--	--	--	--	--
Total	1,843,895	964	3,336	394	--	--	--	--
All species	1,935,671	8,648	64,123	5,137	--	--	--	--

(Table 30 continued on next page)

(Table 30 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	239	--	--	--	--	-	--
Red pine	--	8,998	--	738	--	--	--	--
White pine	--	2,298	--	4,739	71	--	--	--
White spruce	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	-	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	--	1,060	--	419	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	--	12,595	--	5,896	71	--	--	--
Hardwoods								
White oak	--	236,350	3,909	32,974	2,308	1,714	--	1,056
Select red oak	--	335,782	--	51,793	4,829	9,598	--	497
Other red oak	--	162,643	1,234	7,388	1,509	499	--	1,151
Select hickory	--	62,128	—	9,244	--	2,639	--	--
Other hickory	--	23,962	442	14,624	1,055	--	--	--
Basswood	--	47,258	947	75,173	589	541	--	331
Beech	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	1,001	262	--	--	--
Hard maple	--	21,219	--	95,375	--	275	--	--
Soft maple	--	16,753	52,413	21,561	180	698	--	--
Elm	--	35,087	8,687	42,230	1,752	900	--	--
Black ash	--	2,475	9,161	2,497	--	--	--	--
White & green ash	--	9,743	8,612	23,312	2,436	--	--	180
Cottonwood	--	5,003	7,449	3,422	2,020	--	--	--
Willow	--	--	5,767	184	618	--	-	[illegible]
Hackberry	--	78	581	976	--	--	--	--
Balsam poplar	--	1,047	--	--	--	419	--	--
Bigtooth aspen	--	51,964	154	12,970	17,827	4,839	--	--
Quaking aspen	--	27,515	--	11,685	34,804	3,631	--	307
Paper birch	--	42,164	1,527	6,878	5,854	34,828	--	--
River birch	--	591	5,349	--	--	--	--	--
Black cherry	--	28,590	215	17,749	199	852	--	--
Black walnut	--	12,334	—	3,443	--	--	--	456
Butternut	--	13,260	--	8,115	--	--	--	253
Other hardwoods	--	2,620	4,977	3,979	330	149	--	--
Total	--	1,138,566	111,424	446,573	76,572	61,582	--	4,484
All species	--	1,151,161	111,424	452,469	76,643	61,582	--	4,484

Table 31.--Net volume of sawtimber on commercial forest land by species group and forest type, Southwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	19,028	18,139	889	--	--	--	--	--
Red pine	73,260	4,173	47,913	--	--	--	--	--
White pine	57,982	5,231	5,600	14,283	--	--	--	--
White spruce	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	1,837	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	152,107	27,543	54,402	14,283	--	--	--	--
Hardwoods								
White oak	1,037,655	--	--	--	--	--	--	--
Select red oak	1,698,953	--	--	--	--	--	--	--
Other red oak	657,420	1,514	2,346	--	--	--	--	--
Select hickory	161,696	--	--	--	--	--	--	--
Other hickory	29,895	--	--	--	--	--	--	--
Basswood	387,042	--	--	--	--	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	3,262	--	--	--	--	--	--	--
Hard maple	425,061	--	--	--	--	--	--	--
Soft maple	265,802	--	--	--	--	--	--	--
Elm	228,878	1,357	--	--	--	--	--	--
Black ash	30,886	--	--	--	--	--	--	--
White & green ash	131,000	--	--	--	--	--	--	--
Cottonwood	73,983	--	--	1,722	--	--	--	--
Willow	19,288	--	--	--	--	--	--	--
Hackberry	4,632	--	--	--	--	--	--	--
Balsam poplar	6,428	--	--	--	--	--	--	--
Bigtooth aspen	250,507	--	--	--	--	--	--	--
Quaking aspen	136,605	--	--	--	--	--	--	--
Paper birch	115,121	--	--	--	--	--	--	--
River birch	13,929	--	--	--	--	--	--	--
Black cherry	66,409	--	1,147	--	--	--	--	--
Black walnut	59,651	--	--	--	--	--	--	--
Butternut	60,829	--	--	--	--	--	--	--
Other hardwoods	22,074	--	3,128	--	--	--	--	--
Total	5,887,006	2,871	6,621	1,722	--	--	--	--
All species	6,039,113	30,414	61,023	16,005	--	--	--	--

(Table 31 continued on next page)

[1/] International 1/4-inch rule.

(Table 31 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	--	--	--	--	--	--	--
Red pine	--	17,931	--	3,243	--	--	--	--
White pine	--	8,692	--	24,176	--	--	--	--
White spruce	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	1,837	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	--	26,623	--	29,256	--	--	--	--
Hardwoods								
White oak	--	875,456	8,805	139,163	7,113	4,215	--	2,903
Select red oak	--	1,439,902	--	202,564	18,920	35,034	--	2,533
Other red oak	--	608,151	4,075	29,679	6,484	2,486	--	2,685
Select hickory	--	131,051	--	23,270	--	7,375	--	--
Other hickory	--	16,848	--	12,012	1,035	--	--	--
Basswood	--	128,541	4,780	251,136	963	--	--	1,622
Beech	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	2,110	1,152	--	--	--
Hard maple	--	72,142	--	352,919	--	--	--	--
Soft maple	--	33,979	178,070	50,520	--	3,233	--	--
Elm	--	93,825	33,211	95,389	4,333	763	--	--
Black ash	--	8,306	18,761	3,819	--	--	--	--
White & green ash	--	21,432	31,431	74,737	2,326	--	--	1,074
Cottonwood	--	21,378	32,008	13,689	5,186	--	--	--
Willow	--	--	17,447	819	--	--	--	1,022
Hackberry	--	--	2,340	2,292	--	--	--	--
Balsam poplar	--	4,483	--	--	--	1,945	--	--
Bigtooth aspen	--	150,916	813	24,251	58,210	16,317	--	--
Quaking aspen	--	52,183	--	20,592	49,189	14,641	--	--
Paper birch	--	43,884	4,526	3,707	5,047	57,957	--	--
River birch	--	2,723	11,206	--	--	--	--	--
Black cherry	--	33,140	--	30,945	--	1,177	--	--
Black walnut	--	50,257	--	8,117	--	--	--	1,277
Butternut	--	34,897	--	25,932	--	--	--	--
Other hardwoods	--	5,551	6,313	6,174	908	--	--	--
Total	--	3,829,045	353,786	1,373,836	160,866	145,143	--	13,116
All species	--	3,855,668	353,786	1,403,092	160,866	145,143	--	13,116

Table 32.--Net volume of growing stock on commercial forest land by species group and ownership class, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	Ownership class									
	All owners	National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	7,060	--	--	--	886	--	--	5,683	491	--
Red pine	67,514	--	--	--	1,137	--	--	37,[illegible]47	3,655	25,525
White pine	14,305	--	--	--	--	--	--	10,260	--	4,045
White spruce	310	--	--	--	--	--	--	310	--	--
Black spruce	914	--	--	--	--	--	--	--	--	914
Balsam fir	194	--	--	--	--	--	--	--	--	194
Hemlock	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	1,479	--	--	--	--	--	--	1,[illegible]19	--	160
Northern white-cedar	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--
Total	91,776	--	--	--	2,023	--	--	54,769	4,146	30,838
Hardwoods										
White oak	278,311	--	1,650	7,780	619	--	--	187,542	6,820	73,900
Select red oak	403,571	--	--	--	--	--	--	291,720	15,233	96,618
Other red oak	175,245	--	--	711	136	--	--	124,323	5,787	44,288
Select hickory	74,011	--	--	287	--	--	--	51,021	4,232	18,471
Other hickory	40,083	--	--	--	--	--	--	28,[illegible]75	3,822	7,916
Basswood	124,839	--	--	437	--	--	--	84,140	4,393	35,869
Beech	--	--	--	--	--	--	--	--	--	--
Yellow birch	1,263	--	--	--	--	--	--	683	--	580
Hard maple	116,869	--	668	--	--	--	--	88,750	980	26,471
Soft maple	91,605	--	19,771	7,360	--	--	--	54,444	1,056	8,974
Elm	88,963	--	957	2,429	172	--	--	57,645	4,244	23,516
Black ash	14,133	--	295	1,335	--	--	--	5,267	2,319	4,917
White & green ash	44,283	--	2,433	1,963	597	--	--	28,202	2,134	8,954
Cottonwood	18,288	--	2,402	864	--	--	--	11,877	367	2,778
Willow	6,822	--	645	--	--	--	--	5,337	--	840
Hackberry	1,635	--	--	--	--	--	--	1,399	110	126
Balsam poplar	1,466	--	--	--	--	--	--	419	--	1,047
Bigtooth aspen	87,754	--	--	1,662	--	--	--	65,054	3,680	17,358
Quaking aspen	79,237	--	--	--	--	--	--	59,848	6,549	12,840
Paper birch	91,251	--	--	798	--	--	--	63,810	5,232	21,411
River birch	5,940	--	642	1,172	--	--	--	1,314	2,435	377
Black cherry	47,829	--	--	307	--	--	--	37,789	1,070	8,663
Black walnut	16,233	--	--	--	510	--	--	10,927	163	4,633
Butternut	21,628	--	--	335	--	--	--	15,109	2,337	3,847
Other hardwoods	12,636	--	--	--	137	--	--	10,856	--	1,643
Total	1,843,895	--	29,463	27,440	2,171	--	--	1,285,821	72,963	426,037
All species	1,935,671	--	29,463	27,440	4,194	--	--	1,340,590	77,109	456,875

Table 33.--Net volume of sawtimber on commercial forest land by species group and ownership class, Southwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All owners	Ownership class								
		National Forest	Misc. federal	State	County & municipal	Indian	Forest industry	Farmer	Misc. priv.-corp.	Misc. priv.-indiv.
Softwoods										
Jack pine	19,028	--	--	--	--	--	--	18,139	889	--
Red pine	73,260	--	--	--	4,173	--	--	53,986	6,184	8,917
White pine	57,982	--	--	--	--	--	--	38,099	--	19,883
White spruce	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	1,837	--	--	--	--	--	--	943	--	894
Northern white-cedar	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--
Total	152,107	--	--	--	4,173	--	--	111,167	7,073	29,694
Hardwoods										
White oak	1,037,655	--	6,314	28,247	2,630	--	--	700,564	28,274	271,626
Select red oak	1,698,953	--	--	--	--	--	--	1,234,119	71,412	393,422
Other red oak	657,420	--	--	3,538	--	--	--	487,143	16,137	150,602
Select hickory	161,696	--	--	--	--	--	--	104,608	17,995	39,093
Other hickory	29,895	--	--	--	--	--	--	20,876	1,769	7,250
Basswood	387,042	--	--	2,067	--	--	--	274,141	16,593	94,241
Beech	--	--	--	--	--	--	--	--	--	--
Yellow birch	3,262	--	--	--	--	--	--	1,911	--	1,351
Hard maple	425,061	--	3,571	--	--	--	--	327,779	--	93,711
Soft maple	265,802	--	62,423	28,320	--	--	--	149,744	5,129	20,186
Elm	228,878	--	2,770	9,972	774	--	--	153,079	7,988	54,295
Black ash	30,886	--	--	6,081	--	--	--	4,262	6,389	14,154
White & green ash	131,000	--	11,627	2,392	2,887	--	--	73,055	5,462	35,577
Cottonwood	73,983	--	9,940	3,779	--	--	--	47,565	1,653	11,046
Willow	19,288	--	2,599	--	--	--	--	14,743	--	1,946
Hackberry	4,632	--	--	--	--	--	--	4,632	--	--
Balsam poplar	6,428	--	--	--	--	--	--	1,945	--	4,483
Bigtooth aspen	250,507	--	--	4,572	--	--	--	182,584	7,172	56,179
Quaking aspen	136,605	--	--	--	--	--	--	109,661	10,781	16,163
Paper birch	115,121	--	--	1,285	--	--	--	74,500	10,070	29,266
River birch	13,929	--	2,967	2,202	--	--	--	6,083	970	1,707
Black cherry	66,409	--	--	1,647	--	--	--	53,555	--	11,207
Black walnut	59,651	--	--	--	3,408	--	--	40,206	1,036	15,001
Butternut	60,829	--	--	1,803	--	--	--	46,230	6,753	6,043
Other hardwoods	22,074	--	--	--	799	--	--	20,394	--	881
Total	5,887,006	--	102,211	95,905	10,498	--	--	4,133,379	215,583	1,329,430
All species	6,039,113	--	102,211	95,905	14,671	--	--	4,244,546	222,656	1,359,124

[1/] International 1/4-inch rule.

Table 34.--Net volume of growing stock on commercial forest land by forest type and stand-age class, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	8,648	--	--	--	2,715	5,933	--	--	--	--	--	--	--	--
Red pine	64,123	--	10,623	39,549	13,951	--	--	--	--	--	--	--	--	--
White pine	5,137	--	2,247	--	--	--	--	--	2,890	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oak-hickory	1,151,161	35,128	15,397	25,633	33,630	137,170	123,999	98,866	113,650	165,816	121,097	137,112	112,225	31,438
Elm-ash-soft maple	111,424	8,156	3,207	4,305	7,697	8,101	14,419	9,987	17,956	16,377	8,410	12,809	--	--
Maple-birch	452,469	12,774	26,692	27,565	51,288	36,590	64,953	22,239	16,130	51,489	58,411	58,850	13,293	12,195
Aspen	76,643	2,052	8,214	10,020	9,193	15,142	17,939	11,002	--	--	3,081	--	--	--
Paper birch	61,582	2,330	1,346	2,183	12,675	15,247	22,848	4,953	--	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	4,484	4,484	--	--	--	--	--	--	--	--	--	--	--	--
All types	1,935,671	64,924	67,726	109,255	131,149	218,183	244,158	147,047	150,626	233,682	190,999	208,771	125,518	43,633

Table 35.--Net volume of sawtimber on commercial forest land by forest type and stand-age class, Southwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type	All ages	Stand-age class (years)												
		1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-140	141+
Jack pine	30,414	--	--	--	10,862	19,552	--	--	--	--	--	--	--	--
Red pine	61,023	--	--	20,316	40,707	--	--	--	--	--	--	--	--	--
White pine	16,005	--	--	--	--	--	--	--	16,005	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oak-hickory	3,855,668	98,468	48,868	51,578	36,791	300,723	343,366	307,025	384,233	625,155	495,778	559,116	486,322	118,245
Elm-ash-soft maple	353,786	22,356	10,508	2,960	11,272	29,252	37,309	32,920	72,805	62,201	31,103	41,100	--	--
Maple-birch	1,403,092	41,157	87,318	77,943	93,615	67,963	148,100	74,236	52,149	192,037	236,534	216,117	61,455	54,468
Aspen	160,866	4,037	9,464	25,248	20,735	13,712	57,908	18,285	--	--	11,477	--	--	--
Paper birch	145,143	5,697	3,641	2,613	18,010	38,923	64,506	11,753	--	--	--	--	--	--
Exotic	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	13,116	13,116	--	--	--	--	--	--	--	--	--	--	--	--
All types	6,039,113	184,831	159,799	180,658	231,992	470,125	651,189	444,219	525,192	879,393	774,892	816,333	547,777	172,713

[1/] International 1/4-inch rule.

Table 36.--Net volume of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	6,625	--	--	--	--	--	--	--
Poletimber	2,023	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	8,648	--	--	--	--	--	--	--
Red pine								
Sawtimber	7,934	--	--	--	--	--	--	--
Poletimber	55,062	--	--	--	--	--	--	--
Sapling & seedling	1,127	--	174	--	--	--	953	--
All stands	64,123	--	174	--	--	--	953	--
White pine								
Sawtimber	2,890	--	--	--	2,890	--	--	--
Poletimber	2,247	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	5,137	--	--	--	2,890	--	--	--
Balsam fir								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
White spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Black spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Northern white-cedar								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	--	2,715	--	--	3,910	--	--
Poletimber	--	--	--	--	2,023	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	2,715	--	--	5,933	--	--
Red pine							
Sawtimber	--	--	--	--	--	7,934	--
Poletimber	3,411	7,433	--	--	12,128	6,018	26,072
Sapling & seedling	--	--	--	--	--	--	--
All stands	3,411	7,433	--	--	12,128	13,952	26,072
White pine							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	2,247	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	2,247	--	--	--
Balsam fir							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
White spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Northern white-cedar							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Oak-hickory								
Sawtimber	892,212	--	--	3,863	5,555	14,214	30,117	42,185
Poletimber	204,070	--	--	--	1,503	1,102	8,480	12,203
Sapling & seedling	54,879	144	1,617	4,975	6,128	2,981	10,431	6,946
All stands	1,151,161	144	1,617	8,838	13,186	18,297	49,028	61,334
Elm-ash-soft maple								
Sawtimber	81,426	--	--	--	1,413	2,574	7,112	--
Poletimber	17,320	--	--	--	--	--	6,633	--
Sapling & seedling	12,678	--	1,700	2,959	1,513	2,751	1,540	--
All stands	111,424	--	1,700	2,959	2,926	5,325	15,285	--
Maple-birch								
Sawtimber	271,748	--	--	1,167	1,171	6,871	17,702	13,618
Poletimber	132,909	--	--	--	633	6,425	12,390	5,869
Sapling & seedling	47,812	243	2,658	6,124	7,026	15,733	8,838	4,248
All stands	452,469	243	2,658	7,291	8,830	29,029	38,930	23,735
Aspen								
Sawtimber	37,978	--	--	--	--	--	2,578	--
Poletimber	29,581	--	850	--	--	1,466	3,250	2,667
Sapling & seedling	9,084	271	--	--	2,462	5,836	515	--
All stands	76,643	271	850	--	2,462	7,302	6,343	2,667
Paper birch								
Sawtimber	25,131	--	--	--	--	--	2,929	4,935
Poletimber	32,775	--	--	--	--	4,219	--	--
Sapling & seedling	3,676	--	--	--	1,079	--	--	2,597
All stands	61,582	--	--	--	1,079	4,219	2,929	7,532
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Nonstocked	4,484	--	--	180	--	--	1,560	692
All types								
Sawtimber	1,325,944	--	--	5,030	11,029	23,659	60,438	60,738
Poletimber	475,987	--	850	--	2,136	13,212	30,753	20,739
Sapling & seedling	129,256	658	6,149	14,058	18,208	27,301	22,277	13,791
Nonstocked	4,484	--	--	180	--	--	1,560	692
All stands	1,935,671	658	6,999	19,268	31,373	64,172	115,028	95,960

(Table 36 continued on next page)

(Table 36 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Oak-hickory							
Sawtimber	82,574	113,834	89,300	241,494	188,348	72,946	7,782
Poletimber	18,148	26,540	27,443	57,042	31,547	10,562	9,500
Sapling & seedling	2,490	3,837	3,403	7,824	4,103	--	--
All stands	103,212	144,211	120,146	306,360	223,998	83,508	17,282
Elm-ash-soft maple							
Sawtimber	2,402	14,903	7,243	23,887	15,974	5,918	--
Poletimber	2,990	--	--	7,697	--	--	--
Sapling & seedling	--	--	--	--	2,215	--	--
All stands	5,392	14,903	7,243	31,584	18,189	5,918	--
Maple-birch							
Sawtimber	32,004	23,205	24,016	105,652	42,460	3,882	--
Poletimber	14,310	19,486	2,746	38,826	24,937	7,287	--
Sapling & seedling	2,942	--	--	--	--	--	--
All stands	49,256	42,691	26,762	144,478	67,397	11,169	--
Aspen							
Sawtimber	4,036	6,378	--	5,584	19,402	--	--
Poletimber	2,829	--	8,859	4,281	5,379	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	6,865	6,378	8,859	9,865	24,781	--	--
Paper birch							
Sawtimber	2,789	5,663	--	--	--	--	8,815
Poletimber	7,244	2,268	2,664	3,083	13,297	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	10,033	7,931	2,664	3,083	13,297	--	8,815
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	1,463	--	--	589	--	--	--
All types							
Sawtimber	123,805	166,698	120,559	376,617	270,094	90,680	16,597
Poletimber	48,932	55,727	41,712	113,176	89,311	23,867	35,572
Sapling & seedling	5,432	3,837	3,403	7,824	6,318	--	--
Nonstocked	1,463	--	--	589	--	--	--
All stands	179,632	226,262	165,674	498,206	365,723	114,547	52,169

Table 37.--Net volume of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Southwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal-area class (square feet per acre)						
		0-10	11-20	21-30	31-40	41-50	51-60	61-70
Jack pine								
Sawtimber	26,241	--	--	--	--	--	--	--
Poletimber	4,173	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	30,414	--	--	--	--	--	--	--
Red pine								
Sawtimber	33,249	--	--	--	--	--	--	--
Poletimber	27,774	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	61,023	--	--	--	--	--	--	--
White pine								
Sawtimber	16,005	--	--	--	16,005	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	16,005	--	--	--	16,005	--	--	--
Balsam fir								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
White spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Black spruce								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Northern white-cedar								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--

(Table 37 continued on next page)

[1/] International 1/4-inch rule.

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine							
Sawtimber	--	10,862	--	--	15,379	--	--
Poletimber	--	--	--	--	4,173	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	10,862	--	--	19,552	--	--
Red pine							
Sawtimber	--	--	--	--	--	33,249	--
Poletimber	--	7,073	--	--	7,458	--	13,243
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	7,073	--	--	7,458	33,249	13,243
White pine							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Balsam fir							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
White spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Black spruce							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Northern white-cedar							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--

(Table 37 continued on next page)

(Table 37 continued)

Forest type and stand-size class	All classes	Basal-area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70
Tamarack								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Oak-hickory								
Sawtimber	3,375,835	--	--	19,407	26,688	60,294	135,154	176,859
Poletimber	321,623	--	--	--	3,871	1,841	16,567	22,666
Sapling & seedling	158,210	966	5,400	13,182	18,315	10,751	34,532	14,062
All stands	3,855,668	966	5,400	32,589	48,874	72,886	186,253	213,587
Elm-ash-soft maple								
Sawtimber	299,601	--	--	--	4,734	10,040	26,713	--
Poletimber	18,361	--	--	--	--	--	7,089	--
Sapling & seedling	35,824	--	6,652	6,579	5,182	6,755	3,582	--
All stands	353,786	--	6,652	6,579	9,916	16,795	37,384	--
Maple-birch								
Sawtimber	1,004,702	--	--	4,679	5,798	29,554	62,414	53,461
Poletimber	230,176	--	--	--	--	12,068	17,438	7,966
Sapling & seedling	168,214	1,124	11,155	22,112	22,750	54,261	31,643	14,213
All stands	1,403,092	1,124	11,155	26,791	28,548	95,883	111,495	75,640
Aspen								
Sawtimber	113,451	--	--	--	--	--	7,897	--
Poletimber	36,323	--	1,035	--	--	3,536	4,790	--
Sapling & seedling	11,092	--	--	--	2,381	8,711	--	--
All stands	160,866	--	1,035	--	2,381	12,247	12,687	--
Paper birch								
Sawtimber	85,502	--	--	--	--	--	9,855	18,648
Poletimber	50,303	--	--	--	--	7,579	--	--
Sapling & seedling	9,338	--	--	--	1,018	--	--	8,320
All stands	145,143	--	--	--	1,018	7,579	9,855	26,968
Exotic								
Sawtimber	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--
Nonstocked	13,116	--	--	1,074	--	--	5,274	3,329
All types								
Sawtimber	4,954,586	--	--	24,086	53,225	99,888	242,033	248,968
Poletimber	688,733	--	1,035	--	3,871	25,024	45,884	30,632
Sapling & seedling	382,678	2,090	23,207	41,873	49,646	80,478	69,757	36,595
Nonstocked	13,116	--	--	1,074	--	--	5,274	3,329
All stands	6,039,113	2,090	24,242	67,033	106,742	205,390	362,948	319,524

(Table 37 continued)

Forest type and stand-size class	Basal-area class (square feet per acre)						
	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Oak-hickory							
Sawtimber	310,591	452,847	338,732	870,720	671,464	281,919	31,160
Poletimber	23,281	26,789	58,381	91,449	56,314	3,562	16,902
Sapling & seedling	4,437	6,836	6,555	31,964	11,210	--	--
All stands	338,309	486,472	403,668	994,133	738,988	285,481	48,062
Elm-ash-soft maple							
Sawtimber	9,940	54,045	29,964	86,746	61,859	15,560	--
Poletimber	--	--	--	11,272	--	--	--
Sapling & seedling	--	--	--	--	7,074	--	--
All stands	9,940	54,045	29,964	98,018	68,933	15,560	--
Maple-birch							
Sawtimber	114,427	90,507	98,191	393,196	140,778	11,697	--
Poletimber	30,628	33,921	5,356	64,403	42,391	16,005	--
Sapling & seedling	10,956	--	--	--	--	--	--
All stands	156,011	124,428	103,547	457,599	183,169	27,702	--
Aspen							
Sawtimber	14,878	21,973	--	3,578	65,125	--	--
Poletimber	7,037	--	4,315	9,749	5,861	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	21,915	21,973	4,315	13,327	70,986	--	--
Paper birch							
Sawtimber	8,497	19,936	--	--	--	--	28,566
Poletimber	9,832	4,324	5,759	5,415	17,394	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	18,329	24,260	5,759	5,415	17,394	--	28,566
Exotic							
Sawtimber	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--
Nonstocked	3,439	--	--	--	--	--	--
All types							
Sawtimber	458,333	650,170	466,887	1,354,240	954,605	342,425	59,726
Poletimber	70,778	72,107	73,811	182,288	133,591	19,567	30,145
Sapling & seedling	15,393	6,836	6,555	31,964	18,284	--	--
Nonstocked	3,439	--	--	--	--	--	--
All stands	547,943	729,113	547,253	1,568,492	1,106,480	361,992	89,871

Table 38.--Net volume of sawtimber on commercial forest land by species group and butt log grade, Southwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All grades	Log grade 1	2	3	Tie and timber
Softwoods					
Jack pine	19,028	458	1,428	17,142	--
Red pine	73,260	--	--	73,260	--
White pine	57,982	22,207	18,254	17,521	--
White spruce	--	--	--	--	--
Black spruce	--	--	--	--	--
Balsam fir	--	--	--	--	--
Hemlock	--	--	--	--	--
Tamarack	--	--	--	--	--
Eastern redcedar	1,837	--	--	1,837	--
Northern white-cedar	--	--	--	--	--
Other softwoods	--	--	--	--	--
Total	152,107	22,665	19,682	109,760	--
Hardwoods					
White oak	1,037,655	40,616	307,218	567,994	121,827
Select red oak	1,698,953	341,148	537,039	768,729	52,037
Other red oak	657,420	--	110,002	495,536	51,882
Select hickory	161,696	--	43,502	92,797	25,397
Other hickory	29,895	--	--	29,895	--
Basswood	387,042	88,897	63,495	225,122	9,528
Beech	--	--	--	--	--
Yellow birch	3,262	--	685	2,228	349
Hard maple	425,061	56,759	106,456	246,465	15,381
Soft maple	265,802	52,012	32,962	145,494	35,334
Elm	228,878	43,356	51,805	112,698	21,019
Black ash	30,886	--	--	30,886	--
White & green ash	131,000	--	44,455	86,545	--
Cottonwood	73,983	23,441	4,175	42,115	4,252
Willow	19,288	--	15,364	3,924	--
Hackberry	4,632	906	574	2,536	616
Balsam poplar	6,428	--	--	6,428	--
Bigtooth aspen	250,507	--	10,357	240,150	--
Quaking aspen	136,605	--	--	136,605	--
Paper birch	115,121	--	22,837	83,678	8,606
River birch	13,929	--	--	13,929	--
Black cherry	66,409	--	--	66,409	--
Black walnut	59,651	--	--	59,651	--
Butternut	60,829	--	12,729	48,100	--
Other hardwoods	22,074	--	8,987	13,087	--
Total	5,887,006	647,135	1,372,642	3,521,001	346,228
All species	6,039,113	669,800	1,392,324	3,630,761	346,228

[1/] International 1/4-inch rule.

Table 39.--Net volume of short-log trees on commercial forest land by species group and diameter class, Southwest Unit, Wisconsin, 1983

(In thousand cubic feet)

Species group	All classes	Diameter class (inches at breast height) 9.0-10.9	11.0-12.9	13.0-14.9	15.0-16.9	17.0-18.9	19.0-20.9	21.0-22.9	23.0-28.9	29.0-38.9	39.0+
Softwoods											
Jack pine	170	--	170	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	170	--	170	--	--	--	--	--	--	--	--
Hardwoods											
White oak	32,644	--	4,286	7,484	6,056	3,723	2,614	3,421	3,489	1,571	--
Select red oak	24,646	--	--	3,309	5,650	2,250	2,817	2,762	5,257	2,601	--
Other red oak	20,934	--	436	2,696	5,030	4,792	1,637	1,886	3,990	467	--
Select hickory	1,724	--	438	310	752	224	--	--	--	--	--
Other hickory	246	--	246	--	--	--	--	--	--	--	--
Basswood	5,076	--	--	1,373	630	619	522	216	482	205	1,029
Beech	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	--	--	--	--	--	--	--	--
Hard maple	9,938	--	--	1,629	1,069	2,780	1,273	1,156	856	1,175	--
Soft maple	5,649	--	733	668	1,148	554	718	390	492	809	137
Elm	8,568	--	1,133	1,679	2,017	219	1,569	441	512	998	--
Black ash	257	--	--	257	--	--	--	--	--	--	--
White & green ash	2,020	--	215	--	573	442	233	--	557	--	--
Cottonwood	734	--	--	--	--	--	--	--	473	--	261
Willow	788	--	194	--	338	--	--	--	256	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	1,719	--	--	537	341	841	--	--	--	--	--
Quaking aspen	--	--	--	--	--	--	--	--	--	--	--
Paper birch	2,161	--	991	917	--	--	253	--	--	--	--
River birch	645	--	--	--	365	--	280	--	--	--	--
Black cherry	1,647	--	--	559	873	--	--	215	--	--	--
Black walnut	478	--	200	--	--	278	--	--	--	--	--
Butternut	1,990	--	146	417	1,012	202	--	--	213	--	--
Other hardwoods	1,399	--	215	538	254	254	--	--	138	--	--
Total	123,263	--	9,233	22,373	26,108	17,178	11,916	10,487	16,715	7,826	1,427
All species	123,433	--	9,403	22,373	26,108	17,178	11,916	10,487	16,715	7,826	1,427

Table 40.--Net volume of short-log trees on commercial forest land by species group and diameter class, Southwest Unit, Wisconsin, 1983

(In thousand board feet)[1/]

Species group	All classes	Diameter class (inches at breast height) 9.0 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- 22.9	23.0- 28.9	29.0- 38.9	39.0+
Softwoods											
Jack pine	586	--	586	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--
Total	586	--	586	--	--	--	--	--	--	--	--
Hardwoods											
White oak	86,141	--	12,390	20,198	15,981	9,513	6,614	3,625	3,839	3,981	--
Select red oak	55,877	--	--	7,308	12,501	5,061	6,369	5,329	12,132	6,127	--
Other red oak	47,614	--	960	5,966	11,293	10,835	3,730	4,369	9,345	1,116	--
Select hickory	4,581	--	1,173	921	1,909	578	--	--	--	--	--
Other hickory	688	--	688	--	--	--	--	--	--	--	--
Basswood	11,204	--	--	2,908	1,362	1,334	1,142	481	1,086	469	2,422
Beech	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	--	--	--	--	--	--	--	--
Hard maple	24,768	--	--	3,290	2,589	6,820	3,182	2,346	2,219	3,122	--
Soft maple	14,910	--	2,131	1,230	3,066	1,439	1,833	995	1,225	2,033	952
Elm	21,817	--	2,751	4,143	5,012	552	4,066	1,157	1,373	2,763	--
Black ash	738	--	--	738	--	--	--	--	--	--	--
White & green ash	4,597	--	543	--	1,328	1,011	518	--	1,197	--	--
Cottonwood	2,451	--	--	--	--	--	--	--	1,538	--	913
Willow	2,385	--	559	--	1,002	--	--	--	824	--	--
Hackberry	--	--	--	--	--	--	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	2,890	--	--	874	574	1,442	--	--	--	--	--
Quaking aspen	--	--	--	--	--	--	--	--	--	--	--
Paper birch	5,886	--	2,654	2,495	--	--	737	--	--	--	--
River birch	2,121	--	--	--	1,190	--	931	--	--	--	--
Black cherry	4,245	--	--	1,722	2,196	--	--	527	--	--	--
Black walnut	1,295	--	573	--	--	722	--	--	--	--	--
Butternut	5,362	--	515	1,190	2,640	499	--	--	518	--	--
Other hardwoods	5,028	--	815	1,885	896	908	--	--	524	--	--
Total	304,598	--	25,752	55,874	63,539	40,714	29,122	25,429	40,870	19,611	3,687
All species	305,184	--	26,338	55,874	63,539	40,714	29,122	25,429	40,870	19,611	3,687

[1/] International 1/4-inch rule.

Table 41.--Net annual growth of growing stock on commercial forest land by softwoods and hardwoods, Southwest Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967	1982
Softwoods	976	5,520
Hardwoods	36,748	44,709
All species	37,724	50,229

Table 42.--Net annual growth of growing stock on commercial forest land by species group and county, Southwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County							
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin
Softwoods									
Jack pine	193	--	--	77	--	--	78	--	--
Red pine	4,659	328	--	1,468	--	11	233	--	--
White pine	508	--	--	46	33	63	89	--	8
White spruce	23	--	--	--	--	--	--	--	--
Black spruce	38	--	--	--	--	--	--	--	--
Balsam fir	3	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--
Eastern redcedar	96	--	--	--	18	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--
Total	5,520	328	--	1,591	51	74	400	--	8
Hardwoods									
White oak	5,072	307	439	339	780	659	315	154	68
Select red oak	8,644	1,119	819	977	739	365	770	40	201
Other red oak	4,184	629	530	437	561	153	148	85	7
Select hickory	1,927	237	347	--	158	162	234	9	--
Other hickory	1,909	3	195	64	97	125	38	11	--
Basswood	3,570	113	356	229	330	267	198	71	143
Beech	--	--	--	--	--	--	--	--	--
Yellow birch	38	--	--	28	--	--	--	--	--
Hard maple	3,102	21	433	222	306	94	--	--	55
Soft maple	2,740	110	516	575	136	73	70	--	92
Elm	-886	33	-217	17	-227	149	20	-118	-185
Black ash	465	--	82	110	22	144	21	--	13
White & green ash	1,417	113	172	139	49	80	--	16	46
Cottonwood	474	67	3	-15	34	22	89	--	34
Willow	191	--	49	-43	--	-14	24	--	25
Hackberry	87	9	--	--	9	--	11	--	--
Balsam poplar	62	17	--	--	--	--	--	--	--
Bigtooth aspen	1,907	404	179	194	4	120	191	--	113
Quaking aspen	2,607	499	3	241	767	254	191	24	6
Paper birch	2,689	680	122	241	137	66	168	--	136
River birch	139	-3	3	--	97	32	9	--	17
Black cherry	2,221	372	57	25	289	206	101	108	14
Black walnut	438	--	69	4	158	104	--	21	--
Butternut	809	15	-10	34	140	34	23	--	21
Other hardwoods	903	219	22	--	10	59	19	--	13
Total	44,709	4,964	4,169	3,818	4,596	3,154	2,640	421	819
All species	50,229	5,292	4,169	5,409	4,647	3,228	3,040	421	827

(Table 42 continued on the next page)

(Table 42 continued)

Species group	County					
	Pierce	Richland	St. Croix	Sauk	Trempealeau	Vernon
Softwoods						
Jack pine	--	--	--	38	--	--
Red pine	72	--	1,072	180	1,295	--
White pine	--	--	--	59	141	69
White spruce	--	--	23	--	--	--
Black spruce	--	--	--	38	--	--
Balsam fir	--	--	--	3	--	--
Hemlock	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--
Eastern redcedar	--	--	--	8	70	--
Northern white-cedar	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--
Total	72	--	1,095	326	1,506	69
Hardwoods						
White oak	95	437	98	367	302	712
Select red oak	225	552	122	1,226	656	833
Other red oak	77	171	107	335	727	217
Select hickory	--	247	--	205	73	255
Other hickory	272	642	11	178	66	207
Basswood	190	430	79	368	92	704
Beech	--	--	--	--	--	--
Yellow birch	--	--	--	10	--	--
Hard maple	655	648	26	137	--	505
Soft maple	--	205	--	735	168	60
Elm	-148	-88	-156	61	-3	-24
Black ash	--	18	55	-9	-12	21
White & green ash	156	221	104	106	7	208
Cottonwood	92	50	8	--	51	39
Willow	--	-7	--	--	157	--
Hackberry	--	54	--	-4	--	8
Balsam poplar	--	--	--	--	45	--
Bigtooth aspen	48	155	43	332	175	-51
Quaking aspen	50	-6	259	14	-37	342
Paper birch	85	130	328	40	406	150
River birch	--	--	--	--	-16	--
Black cherry	102	87	-27	457	168	262
Black walnut	--	21	--	--	--	61
Butternut	255	235	5	14	--	43
Other hardwoods	54	65	239	--	30	173
Total	2,208	4,267	1,301	4,572	3,055	4,725
All species	2,280	4,267	2,396	4,898	4,561	4,794

Table 43.--Net annual growth of sawtimber on commercial forest land by species group and county, Southwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County							
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin
Softwoods									
Jack pine	951	--	--	311	--	--	640	--	--
Red pine	6,865	187	--	2,882	--	--	2,151	--	--
White pine	1,834	--	--	194	203	318	579	--	43
White spruce	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--
Eastern redcedar	105	--	--	--	63	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--
Total	9,755	187	--	3,387	266	318	3,370	--	43
Hardwoods									
White oak	26,203	1,630	1,816	2,046	4,563	2,726	1,299	882	225
Select red oak	42,851	4,829	3,643	4,062	3,665	1,681	4,548	208	963
Other red oak	19,558	2,742	1,449	850	2,734	572	1,243	484	92
Select hickory	6,446	730	461	--	489	759	613	13	--
Other hickory	2,165	13	306	--	78	23	253	--	--
Basswood	15,119	442	1,894	975	1,125	890	671	157	490
Beech	--	--	--	--	--	--	--	--	--
Yellow birch	85	--	--	68	--	--	--	--	--
Hard maple	12,036	105	912	1,157	1,521	211	--	--	285
Soft maple	7,818	669	1,384	1,638	666	115	234	--	283
Elm	-3,154	1,047	-1,152	81	-672	524	886	-651	-1,278
Black ash	1,111	--	40	345	284	--	29	--	-29
White & green ash	7,112	1,629	634	779	425	81	--	54	194
Cottonwood	2,143	253	14	-68	148	104	236	--	124
Willow	1,055	--	935	-183	--	29	--	--	111
Hackberry	251	--	--	--	--	--	--	--	--
Balsam poplar	428	130	--	--	--	--	--	--	--
Bigtooth aspen	6,719	1,523	515	1,440	198	334	-297	--	798
Quaking aspen	7,099	2,322	187	381	71	--	215	77	246
Paper birch	5,870	1,444	634	578	176	352	108	--	136
River birch	266	6	21	--	17	38	113	--	142
Black cherry	3,868	696	--	150	25	240	227	116	--
Black walnut	3,057	--	297	--	1,906	371	--	--	--
Butternut	3,200	-46	132	301	--	56	294	--	33
Other hardwoods	1,631	139	876	--	63	176	66	--	102
Total	172,937	20,303	14,998	14,600	17,482	9,282	10,738	1,340	2,917
All species	182,692	20,490	14,998	17,987	17,748	9,600	14,108	1,340	2,960

[1/] International 1/4-inch rule.

(Table 43 continued)

Species group	County					
	Pierce	Richland	St. Croix	Sauk	Trempealeau	Vernon
Softwoods						
Jack pine	--	--	--	--	--	--
Red pine	237	--	1,147	261	--	--
White pine	--	--	--	284	--	213
White spruce	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--
Eastern redcedar	--	--	--	42	--	--
Northern white-cedar	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--
Total	237	--	1,147	587	--	213
Hardwoods						
White oak	292	1,707	134	3,966	1,485	3,432
Select red oak	1,469	2,362	837	6,039	3,560	4,985
Other red oak	392	1,001	469	1,616	4,583	1,331
Select hickory	--	1,061	--	1,324	19	977
Other hickory	238	112	--	994	--	148
Basswood	965	1,837	1,230	1,170	246	3,027
Beech	--	--	--	--	--	--
Yellow birch	--	--	--	17	--	--
Hard maple	2,720	2,500	123	260	--	2,242
Soft maple	--	965	--	983	786	95
Elm	223	-685	-429	-268	-393	-387
Black ash	--	--	458	-48	--	32
White & green ash	1,338	1,385	30	28	28	507
Cottonwood	435	237	28	--	197	435
Willow	--	-35	--	--	198	--
Hackberry	--	316	--	-65	--	--
Balsam poplar	--	--	--	--	298	--
Bigtooth aspen	218	766	518	400	555	-249
Quaking aspen	190	66	1,924	1,049	371	--
Paper birch	333	47	354	19	1,779	-90
River birch	--	--	--	--	-71	--
Black cherry	19	133	--	207	1,609	446
Black walnut	--	--	--	--	--	483
Butternut	1,445	417	--	139	--	429
Other hardwoods	131	62	16	--	--	--
Total	10,408	14,254	5,692	17,830	15,250	17,843
All species	10,645	14,254	6,839	18,417	15,250	18,056

Table 44.--Net annual growth of growing stock on commercial forest land by ownership class and softwoods and hardwoods, Southwest Unit, Wisconsin, 1982

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	- - - - Thousand cubic feet - - - -			- - - Thousand board feet[1] - - -		
National Forest	--	--	--	--	--	--
Miscellaneous federal	258	--	258	1,253	--	1,253
State	369	--	369	1,957	--	1,957
County and municipal	89	77	12	1,690	261	1,429
Indian	--	--	--	--	--	--
Forest industry	--	--	--	--	--	--
Farmer	33,586	2,471	31,115	123,556	6,139	117,417
Misc. private-corp.	2,157	189	1,968	8,071	1,332	6,739
Misc. private-indiv.	13,770	2,783	10,987	46,165	2,023	44,142
All owners	50,229	5,520	44,709	182,692	9,755	172,937

[1] International 1/4-inch rule.

Table 45.--Net annual growth of growing stock on commercial forest land by species group and type, Southwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	193	145	39	--	--	--	--	--
Red pine	4,659	39	4,188	--	--	--	--	--
White pine	508	29	16	230	--	--	--	--
White spruce	23	--	23	--	--	--	--	--
Black spruce	38	--	38	--	--	--	--	--
Balsam fir	3	--	3	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	96	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	5,520	213	4,307	230	--	--	--	--
Hardwoods								
White oak	5,072	--	--	--	--	--	--	--
Select red oak	8,644	--	28	--	--	--	--	--
Other red oak	4,184	5	8	--	--	--	--	--
Select hickory	1,927	--	--	--	--	--	--	--
Other hickory	1,909	--	--	--	--	--	--	--
Basswood	3,570	--	--	--	--	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	38	--	--	--	--	--	--	--
Hard maple	3,102	--	--	--	--	--	--	--
Soft maple	2,740	--	--	--	--	--	--	--
Elm	-886	13	--	--	--	--	--	--
Black ash	465	--	--	--	--	--	--	--
White & green ash	1,417	--	--	--	--	--	--	--
Cottonwood	474	--	--	8	--	--	--	--
Willow	191	--	--	--	--	--	--	--
Hackberry	87	--	--	--	--	--	--	--
Balsam poplar	62	--	--	--	--	--	--	--
Bigtooth aspen	1,907	--	--	--	--	--	--	--
Quaking aspen	2,607	13	-27	--	--	--	--	--
Paper birch	2,689	--	--	--	--	--	--	--
River birch	139	--	--	--	--	--	--	--
Black cherry	2,221	--	2	--	--	--	--	--
Black walnut	438	--	--	--	--	--	--	--
Butternut	809	--	--	--	--	--	--	--
Other hardwoods	903	--	12	--	--	--	--	--
Total	44,709	31	23	8	--	--	--	--
All species	50,229	244	4,330	238	--	--	--	--

(Table 45 continued on next page)

(Table 45 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	9	--	--	--	--	--	--
Red pine	--	406	--	26	--	--	--	--
White pine	--	91	--	134	8	--	--	--
White spruce	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	--	70	--	26	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	--	576	--	186	8	--	--	--
Hardwoods								
White oak	--	4,300	165	524	39	28	--	16
Select red oak	--	6,980	--	1,340	66	221	--	9
Other red oak	--	3,926	49	129	27	7	--	33
Select hickory	--	1,611	--	215	--	101	--	--
Other hickory	--	990	19	839	61	--	--	--
Basswood	--	1,477	34	2,004	27	19	--	9
Beech	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	33	5	--	--	--
Hard maple	--	649	--	2,444	--	9	--	--
Soft maple	--	736	1,329	645	14	16	--	--
Elm	--	-80	-792	80	26	-39	--	-94
Black ash	--	57	343	65	--	--	--	--
White & green ash	--	356	251	726	77	--	--	7
Cottonwood	--	124	169	95	78	--	--	--
Willow	--	--	149	11	24	--	--	7
Hackberry	--	9	30	48	--	--	--	--
Balsam poplar	--	45	--	--	--	17	--	--
Bigtooth aspen	--	596	10	478	764	59	--	--
Quaking aspen	--	818	--	307	1,470	40	--	-14
Paper birch	--	1,230	51	236	132	1,040	--	--
River birch	--	5	134	--	--	--	--	--
Black cherry	--	1,271	7	908	--	33	--	--
Black walnut	--	328	--	98	--	--	--	12
Butternut	--	438	--	366	--	--	--	5
Other hardwoods	--	248	275	343	19	6	--	--
Total	--	26,114	2,223	11,934	2,829	1,557	--	-10
All species	--	26,690	2,223	12,120	2,837	1,557	--	-10

Table 46.--Net annual growth of sawtimber on commercial forest land by species group and type, Southwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	951	899	52	--	--	--	--	--
Red pine	6,865	261	5,000	--	--	--	--	--
White pine	1,834	168	84	579	--	--	--	--
White spruce	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	105	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	9,755	1,328	5,136	579	--	--	--	--
Hardwoods								
White oak	26,203	--	--	--	--	--	--	--
Select red oak	42,851	--	--	--	--	--	--	--
Other red oak	19,558	27	36	--	--	--	--	--
Select hickory	6,446	--	--	--	--	--	--	--
Other hickory	2,165	--	--	--	--	--	--	--
Basswood	15,119	--	--	--	--	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	85	--	--	--	--	--	--	--
Hard maple	12,036	--	--	--	--	--	--	--
Soft maple	7,818	--	--	--	--	--	--	--
Elm	-3,154	104	--	--	--	--	--	--
Black ash	1,111	--	--	--	--	--	--	--
White & green ash	7,112	--	--	--	--	--	--	--
Cottonwood	2,143	--	--	36	--	--	--	--
Willow	1,055	--	--	--	--	--	--	--
Hackberry	251	--	--	--	--	--	--	--
Balsam poplar	428	--	--	--	--	--	--	--
Bigtooth aspen	6,719	--	--	--	--	--	--	--
Quaking aspen	7,099	--	--	--	--	--	--	--
Paper birch	5,870	--	--	--	--	--	--	--
River birch	266	--	--	--	--	--	--	--
Black cherry	3,868	--	6	--	--	--	--	--
Black walnut	3,057	--	--	--	--	--	--	--
Butternut	3,200	--	--	--	--	--	--	--
Other hardwoods	1,631	--	66	--	--	--	--	--
Total	172,937	131	108	36	--	--	--	--
All species	182,692	1,459	5,244	615	--	--	--	--

(Table 46 continued on next page)

[1/] International 1/4-inch rule.

(Table 46 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotic	Non-stocked
Softwoods								
Jack pine	--	--	--	--	--	--	--	--
Red pine	--	457	--	1,147	--	--	--	--
White pine	--	362	--	641	--	--	--	--
White spruce	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	105	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	--	819	--	1,893	--	--	--	--
Hardwoods								
White oak	--	22,085	29	3,773	113	169	--	34
Select red oak	--	35,726	--	5,903	576	599	--	47
Other red oak	--	17,953	151	994	233	36	--	128
Select hickory	--	5,569	--	619	--	258	--	--
Other hickory	--	1,583	--	559	23	--	--	--
Basswood	--	5,852	174	8,088	958	--	--	47
Beech	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	59	26	--	--	--
Hard maple	--	2,288	--	9,748	--	--	--	--
Soft maple	--	1,227	4,975	1,543	--	73	--	--
Elm	--	1,135	-2,589	-1,937	640	-273	--	-234
Black ash	--	241	742	128	--	--	--	--
White & green ash	--	964	1,250	3,649	1,219	--	--	30
Cottonwood	--	580	987	403	137	--	--	--
Willow	--	--	986	40	--	--	--	29
Hackberry	--	--	156	95	--	--	--	--
Balsam poplar	--	298	--	--	--	130	--	--
Bigtooth aspen	--	3,210	51	885	2,150	423	--	--
Quaking aspen	--	2,389	--	1,960	1,953	797	--	--
Paper birch	--	1,653	176	63	177	3,801	--	--
River birch	--	74	192	--	--	--	--	--
Black cherry	--	1,327	--	2,496	--	39	--	--
Black walnut	--	1,654	--	1,374	--	--	--	29
Butternut	--	1,148	--	2,052	--	--	--	--
Other hardwoods	--	230	1,137	156	42	--	--	--
Total	--	107,186	8,417	42,650	8,247	6,052	--	110
All species	--	108,005	8,417	44,543	8,247	6,052	--	110

Table 47.--Net annual growth of growing stock on commercial forest land by forest type, stand-size class, and basal-area class, Southwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	167	--	--	--	--	--	--	--	--	70	--	--	97	--	--
Poletimber	77	--	--	--	--	--	--	--	--	--	--	--	77	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	244	--	--	--	--	--	--	--	--	70	--	--	174	--	--
Red pine															
Sawtimber	259	--	--	--	--	--	--	--	--	--	--	--	--	259	--
Poletimber	3,462	--	--	--	--	--	--	--	218	400	--	--	1,070	855	919
Sapling & seedling	609	--	174	--	--	--	435	--	--	--	--	--	--	--	--
All stands	4,330	--	174	--	--	--	435	--	218	400	--	--	1,070	1,114	919
White pine															
Sawtimber	97	--	--	--	97	--	--	--	--	--	--	--	--	--	--
Poletimber	141	--	--	--	--	--	--	--	--	--	--	141	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	238	--	--	--	97	--	--	--	--	--	--	141	--	--	--
Balsam fir															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

(Table 47 continued on next page)

(Table 47 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oak-hickory															
Sawtimber	17,650	--	--	135	168	351	687	857	1,546	2,554	1,650	4,959	3,480	1,136	127
Poletimber	6,964	--	--	--	101	151	425	460	738	887	771	1,884	839	402	306
Sapling & seedling	2,076	9	60	231	181	135	498	284	19	274	150	113	122	--	--
All stands	26,690	9	60	366	450	637	1,610	1,601	2,303	3,715	2,571	6,956	4,441	1,538	433
Elm-ash-soft maple															
Sawtimber	950	--	--	--	16	-31	215	--	39	281	198	85	113	34	--
Poletimber	710	--	--	--	--	--	215	--	137	--	--	358	--	--	--
Sapling & seedling	563	--	100	150	58	67	109	--	--	--	--	--	79	--	--
All stands	2,223	--	100	150	74	36	539	--	176	281	198	443	192	34	--
Maple-birch															
Sawtimber	5,744	--	--	77	--	132	394	282	797	530	314	2,202	944	72	--
Poletimber	4,909	--	--	--	26	210	716	64	471	780	87	1,384	1,007	164	--
Sapling & seedling	1,467	5	135	339	358	346	188	42	54	--	--	--	--	--	--
All stands	12,120	5	135	416	384	688	1,298	388	1,322	1,310	401	3,586	1,951	236	--
Aspen															
Sawtimber	748	--	--	--	--	--	70	--	41	207	--	257	173	--	--
Poletimber	1,185	--	445	--	--	50	148	40	41	--	319	70	72	--	--
Sapling & seedling	904	17	--	--	73	615	199	--	--	--	--	--	--	--	--
All stands	2,837	17	445	--	73	665	417	40	82	207	319	327	245	--	--
Paper birch															
Sawtimber	371	--	--	--	--	--	67	63	36	87	--	--	--	--	118
Poletimber	1,089	--	--	--	--	290	--	--	232	67	69	89	342	--	--
Sapling & seedling	97	--	--	--	40	--	--	57	--	--	--	--	--	--	--
All stands	1,557	--	--	--	40	290	67	120	268	154	69	89	342	--	118
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	-10	--	--	7	--	--	-30	-12	9	--	--	16	--	--	--
All types															
Sawtimber	25,986	--	--	212	281	452	1,433	1,202	2,459	3,729	2,162	7,503	4,807	1,501	245
Poletimber	18,537	--	445	--	127	701	1,504	564	1,837	2,134	1,246	3,926	3,407	1,421	1,225
Sapling & seedling	5,716	31	469	720	710	1,163	1,429	383	73	274	150	113	201	--	--
Nonstocked	-10	--	--	7	--	--	-30	-12	9	--	--	16	--	--	--
All stands	50,229	31	914	939	1,118	2,316	4,336	2,137	4,378	6,137	3,558	11,558	8,415	2,922	1,470

Table 48.--Net annual growth of sawtimber on commercial forest land by forest type, stand-size class, and basal-area class, Southwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Forest type and stand-size class	All classes	Basal area class (square feet per acre)													
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Jack pine															
Sawtimber	1,198	--	--	--	--	--	--	--	--	531	--	--	667	--	--
Poletimber	261	--	--	--	--	--	--	--	--	--	--	--	261	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	1,459	--	--	--	--	--	--	--	--	531	--	--	928	--	--
Red pine															
Sawtimber	2,217	--	--	--	--	--	--	--	--	--	--	--	--	2,217	--
Poletimber	3,027	--	--	--	--	--	--	--	--	1,332	--	--	1,285	--	410
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	5,244	--	--	--	--	--	--	--	--	1,332	--	--	1,285	2,217	410
White pine															
Sawtimber	615	--	--	--	615	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	615	--	--	--	615	--	--	--	--	--	--	--	--	--	--
Balsam fir															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

[1/] International 1/4-inch rule.

(Table 48 continued on next page)

(Table 48 continued)

Forest type and stand-size class	All classes	Basal area class (square feet per acre) 0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-120	121-150	151-180	181+
Tamarack															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oak-hickory															
Sawtimber	89,129	--	--	735	932	1,959	2,537	4,951	9,683	14,512	8,979	24,095	14,814	5,210	722
Poletimber	12,280	--	--	--	258	40	43	1,145	668	471	2,580	3,839	2,135	130	971
Sapling & seedling	6,596	64	816	1,382	543	524	991	690	64	334	199	683	306	--	--
All stands	108,005	64	816	2,117	1,733	2,523	3,571	6,786	10,415	15,317	11,758	28,617	17,255	5,340	1,693
Elm-ash-soft maple															
Sawtimber	5,111	--	--	--	180	69	851	--	435	1,407	1,213	537	572	-153	--
Poletimber	510	--	--	--	--	--	220	--	--	--	--	290	--	--	--
Sapling & seedling	2,796	--	363	269	293	1,661	76	--	--	--	--	--	134	--	--
All stands	8,417	--	363	269	473	1,730	1,147	--	435	1,407	1,213	827	706	-153	--
Maple-birch															
Sawtimber	26,542	--	--	312	125	465	2,399	726	3,118	2,549	2,647	9,386	4,275	540	--
Poletimber	12,094	--	--	--	--	120	4,095	-947	656	1,414	242	2,997	2,791	726	--
Sapling & seedling	5,907	25	541	671	1,178	1,749	1,340	263	140	--	--	--	--	--	--
All stands	44,543	25	541	983	1,303	2,334	7,834	42	3,914	3,963	2,889	12,383	7,066	1,266	--
Aspen															
Sawtimber	4,771	--	--	--	--	--	1,287	--	398	979	--	-118	2,225	--	--
Poletimber	2,343	--	23	--	--	187	835	--	268	--	251	400	379	--	--
Sapling & seedling	1,133	--	--	--	20	1,113	--	--	--	--	--	--	--	--	--
All stands	8,247	--	23	--	20	1,300	2,122	--	666	979	251	282	2,604	--	--
Paper birch															
Sawtimber	2,782	--	--	--	--	--	342	763	291	662	--	--	--	--	724
Poletimber	3,062	--	--	--	--	528	--	--	1,122	125	258	119	910	--	--
Sapling & seedling	208	--	--	--	19	--	--	189	--	--	--	--	--	--	--
All stands	6,052	--	--	--	19	528	342	952	1,413	787	258	119	910	--	724
Exotic															
Sawtimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Poletimber	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sapling & seedling	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
All stands	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nonstocked	110	--	--	30	--	--	-57	71	66	--	--	--	--	--	--
All types															
Sawtimber	132,365	--	--	1,047	1,852	2,493	7,416	6,440	13,925	20,640	12,839	33,900	22,553	7,814	1,446
Poletimber	33,577	--	23	--	258	875	5,193	198	2,714	3,342	3,331	7,645	7,761	856	1,381
Sapling & seedling	16,640	89	1,720	2,322	2,053	5,047	2,407	1,142	204	334	199	683	440	--	--
Nonstocked	110	--	--	30	--	--	-57	71	66	--	--	--	--	--	--
All stands	182,692	89	1,743	3,399	4,163	8,415	14,959	7,851	16,909	24,316	16,369	42,228	30,754	8,670	2,827

Table 49.--Timber removals[1/] from growing stock on commercial forest land by species group and county, Southwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All counties	County													
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin	Pierce	Richland	St. Croix	Sauk	Trempealeau	Vernon
Softwoods															
Jack pine	315	--	--	230	--	--	3	--	--	--	--	--	82	--	--
Red pine	1,648	1	--	1,247	--	--	20	--	--	2	--	--	226	152	--
White pine	230	--	--	117	1	2/	2/	--	15	--	--	--	25	53	19
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	2,193	1	--	1,594	1	2/	23	--	15	2	--	--	333	205	19
Hardwoods															
White oak	3,972	361	283	258	703	348	208	54	141	72	214	25	534	339	432
Select red oak	10,627	1,585	761	966	645	384	818	3	462	247	463	195	1,849	988	1,261
Other red oak	4,981	969	300	335	459	323	389	24	14	82	192	58	392	1,068	376
Hickory	231	36	9	8	1	10	24	--	--	8	5	1	58	20	51
Basswood	1,293	144	33	191	61	28	19	1	54	246	90	35	222	82	87
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	39	--	--	26	--	--	--	--	--	--	--	--	13	--	--
Hard maple	1,234	36	71	214	44	13	--	--	68	248	219	--	129	--	192
Soft maple	1,208	156	62	152	73	14	219	--	62	--	49	--	190	131	100
Elm	1,729	161	79	200	258	261	45	1	59	169	131	168	80	43	74
Ash	411	49	28	72	17	10	10	--	22	32	85	6	24	14	42
Cottonwood	85	24	3	10	11	--	1	--	4	18	1	--	--	7	6
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	1,229	163	19	124	9	3	88	--	45	6	60	6	417	269	20
Quaking aspen	566	164	3	52	13	3	43	--	15	10	8	23	39	163	30
Paper birch	287	140	6	6	4	--	9	--	15	3	--	49	15	33	7
Black walnut	99	--	12	--	37	35	--	1	--	--	12	--	--	--	2
Other hardwoods[3/]	438	141	8	10	9	48	52	1	10	1	9	7	26	82	34
Total	28,429	4,129	1,677	2,624	2,344	1,480	1,925	85	971	1,142	1,538	573	3,988	3,239	2,714
All species	30,622	4,130	1,677	4,218	2,345	1,480	1,948	85	986	1,144	1,538	573	4,321	3,444	2,733

1/ Removals in 1982 are trend-level removals.

2/ Less than 500 cubic feet.

3/ Includes black cherry and butternut.

Table 50.--Timber removals from sawtimber on commercial forest land by species group and county, Southwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All counties	County													
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin	Pierce	Richland	St. Croix	Sauk	Trempealeau	Vernon
Softwoods															
Jack pine	354	--	--	350	--	--	4	--	--	--	--	--	--	--	--
Red pine	1,464	5	--	1,202	--	--	37	--	--	3	--	--	217	--	--
White pine	854	--	--	580	5	1	1	--	84	--	--	--	86	--	97
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	2,672	5	--	2,132	5	1	42	--	84	3	--	--	303	--	97
Hardwoods															
White oak	18,124	1,488	1,352	1,206	3,393	1,697	1,025	287	600	312	1,109	90	1,918	1,574	2,073
Select red oak	49,484	7,745	3,999	5,175	3,065	1,883	4,406	16	2,040	1,122	2,290	373	6,009	4,956	6,405
Other red oak	21,004	4,550	1,067	1,015	1,693	1,375	1,630	81	62	400	893	228	1,853	4,574	1,583
Hickory	1,027	172	44	--	7	48	112	--	--	31	23	--	290	99	201
Basswood	5,216	666	137	920	274	133	94	4	217	1,177	429	36	390	321	418
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	2	--	--	1	--	--	--	--	--	--	--	--	1	--	--
Hard maple	6,206	119	361	1,119	211	71	--	--	316	1,326	1,181	--	467	--	1,035
Soft maple	3,545	623	5	423	169	21	571	--	140	--	98	--	514	544	437
Elm	6,436	492	309	921	1,002	737	195	5	209	775	494	439	305	208	345
Ash	1,875	113	135	330	82	49	50	--	85	154	470	26	108	68	205
Cottonwood	406	116	11	48	48	1	5	--	16	97	9	--	--	30	25
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	4,032	811	63	680	52	15	301	--	174	38	300	31	288	1,159	120
Quaking aspen	1,804	714	7	162	14	--	82	--	15	36	23	71	204	476	--
Paper birch	495	134	17	24	3	--	41	--	39	17	--	22	37	161	--
Black walnut	338	--	58	--	179	91	--	--	--	--	--	--	--	--	10
Other hardwoods[2/]	1,245	301	37	50	37	133	170	4	33	3	42	30	119	255	31
Total	121,239	18,044	7,602	12,074	10,229	6,254	8,682	397	3,946	5,488	7,361	1,346	12,503	14,425	12,888
All species	123,911	18,049	7,602	14,206	10,234	6,255	8,724	397	4,030	5,491	7,361	1,346	12,806	14,425	12,985

[1/] International 1/4-inch rule.

[2/] Includes black cherry and butternut.

Table 51.--Growing-stock average annual removals on commercial forest land by species group and county, Southwest Unit, Wisconsin, 1967-1982

(In thousand cubic feet per year)

Species group	All counties	County														
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin	Pierce	Richland	St. Croix	Sauk	Trempealeau	Vernon
Softwoods																
Jack pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardwoods																
White oak	2,427	46	45	73	353	154	56	--	45	--	49	--	920	439	247	
Select red oak	10,176	1,479	299	568	432	86	1,091	--	336	339	--	126	4,612	300	508	
Other red oak	2,576	475	268	587	--	--	171	--	--	--	--	204	328	316	227	
Hickory	93	40	--	--	--	--	--	--	--	--	--	--	43	--	10	
Basswood	1,255	--	--	232	--	--	--	--	--	244	101	31	574	--	73	
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Yellow birch	44	--	--	--	--	--	--	--	--	--	--	--	44	--	--	
Hard maple	1,270	--	--	--	213	--	--	--	--	--	--	921	136	--	--	
Soft maple	817	400	--	117	--	--	--	--	--	--	--	--	300	--	--	
Elm	1,575	68	--	108	268	227	115	--	--	130	283	281	53	--	42	
Ash	237	30	--	--	--	40	--	--	--	53	54	--	--	--	60	
Cottonwood	73	--	--	--	--	--	--	--	--	--	73	--	--	--	--	
Willow	24	24	--	--	--	--	--	--	--	--	--	--	--	--	--	
Hackberry	51	--	--	--	--	--	--	--	--	--	51	--	--	--	--	
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Bigtooth aspen	764	--	--	89	--	--	--	--	--	--	214	--	399	--	62	
Quaking aspen	86	--	--	86	--	--	--	--	--	--	--	--	--	--	--	
Paper birch	176	128	--	--	--	--	--	--	--	--	--	48	--	--	--	
River birch	66	66	--	--	--	--	--	--	--	--	--	--	--	--	--	
Black cherry	54	--	--	--	--	--	--	--	--	--	--	--	--	31	23	
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Butternut	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Other hardwoods	8	--	--	--	--	--	--	--	--	--	--	--	--	--	8	
Total	21,772	2,756	612	1,860	1,266	507	1,433	--	381	766	825	1,611	7,409	1,086	1,260	
All species	21,772	2,756	612	1,860	1,266	507	1,433	--	381	766	825	1,611	7,409	1,086	1,260	

Table 52.--Sawtimber average annual removals on commercial forest land by species group and county, Southwest Unit, Wisconsin, 1967-1982

(In thousand board feet per year)[1/]

Species group	All counties	County														
		Buffalo	Crawford	Dunn	Grant	Iowa	La Crosse	Lafayette	Pepin	Pierce	Richland	St. Croix	Sauk	Trempealeau	Vernon
Softwoods																
Jack pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Red pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White pine	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hardwoods																
White oak	10,659	--	--	371	1,758	749	279	--	221	--	237	--	3,556	2,334	1,154
Select red oak	46,456	7,411	1,604	2,888	2,189	424	5,456	--	1,694	1,791	--	--	14,394	3,291	2,504
Other red oak	10,632	1,534	1,267	2,825	--	--	835	--	--	--	--	592	1,949	1,553	477
Hickory	440	204	--	--	--	--	--	--	--	--	--	--	236	--	--
Basswood	5,236	--	--	1,139	--	--	--	--	--	1,223	494	--	2,021	--	354
Beech	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow birch	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hard maple	6,253	--	--	--	1,136	--	--	--	--	--	--	4,608	509	--	--
Soft maple	2,144	--	--	628	--	--	--	--	--	--	--	--	1,516	--	--
Elm	6,401	--	--	474	1,249	997	508	--	--	591	1,234	1,114	234	--	--
Ash	1,090	--	--	--	--	216	--	--	--	270	524	--	--	--	280
Cottonwood	310	--	--	--	--	--	--	--	--	--	310	--	--	--	--
Willow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hackberry	233	--	--	--	--	--	--	--	--	--	233	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bigtooth aspen	1,767	--	--	453	--	--	--	--	--	--	1,027	--	--	--	287
Quaking aspen	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Paper birch	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
River birch	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black cherry	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black walnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Butternut	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Other hardwoods	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	91,623	9,149	2,771	8,778	6,332	2,386	7,080	--	1,915	3,790	3,859	6,314	29,015	5,178	5,056
All species	91,623	9,149	2,771	8,778	6,332	2,386	7,080	--	1,915	3,790	3,859	6,314	29,015	5,178	5,056

[1/] International ¼-inch rule.

Table 53.--Timber removals from growing stock and sawtimber on commercial forest land by species group, Southwest Unit, Wisconsin, 1967 and 1982

Species group	Growing stock		Sawtimber	
	1967	1982	1967	1982
	Thousand cubic feet		Thousand board feet[1]	
Softwoods				
Jack pine	55	315	121	354
Red pine	37	1,648	57	1,464
White pine	171	230	984	854
White spruce	--	--	--	--
Black spruce	--	--	--	--
Balsam fir	--	--	--	--
Hemlock	--	--	--	--
Tamarack	1	--	--	--
Northern white-cedar	--	--	--	--
Other softwoods	1	--	--	--
Total	265	2,193	1,162	2,672
Hardwoods				
White oak	3,819	3,972	10,310	18,124
Select red oak	9,703	10,627	38,247	49,484
Other red oak	3,589	4,981	10,921	21,004
Hickory	1,192	231	1,394	1,027
Basswood	1,816	1,293	6,305	5,216
Beech	--	--	--	--
Yellow birch	8	39	51	2
Hard maple	1,972	1,234	7,128	6,206
Soft maple	1,036	1,208	1,871	3,545
Elm	2,309	1,729	5,842	6,436
Ash	610	411	1,379	1,875
Cottonwood	215	85	642	406
Balsam poplar	3	--	2	--
Bigtooth aspen	815	1,229	1,179	4,032
Quaking aspen	1,327	566	2,179	1,804
Paper birch	634	287	621	495
Black walnut	258	99	1,446	338
Other hardwoods[2]	279	438	1,246	1,245
Total	29,585	28,429	90,763	121,239
All species	29,850	30,622	91,925	123,911

[1] International 1/4-inch rule.

[2] Includes black cherry and butternut.

Table 54.--Timber removals from growing stock and sawtimber on commercial forest land by item and species category, Southwest Unit, Wisconsin, 1982

Item	Growing stock						Sawtimber					
	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods	All species	Pine	Other softwoods	Aspen	Oak	Other hardwoods
	Thousand cubic feet						Thousand board feet[1]					
Roundwood products												
Pulpwood[2]	1,274	1,028	--	32	124	90	1,363	1,035	--	61	152	115
Saw logs	17,851	265	--	581	13,505	3,500	93,830	1,028	--	2,670	71,977	18,155
Fuelwood	2,909	--	--	112	1,576	1,221	8,170	--	--	302	4,457	3,411
Posts	999	770	--	91	138	--	889	415	--	178	296	--
Veneer logs	518	--	--	3/	432	86	3,341	--	--	1	2,790	550
Poles	--	--	--	--	--	--	--	--	--	--	--	--
Other	709	--	--	422	94	193	3,710	--	--	2,005	706	999
Total	24,260	2,063	--	1,238	15,869	5,090	111,303	2,478	--	5,217	80,378	23,230
Logging residue	2,642	130	--	162	1,854	496	7,279	194	--	392	5,252	1,441
Other removals	3,720	--	--	395	1,857	1,468	5,329	--	--	227	2,982	2,120
All removals	30,622	2,193	--	1,795	19,580	7,054	123,911	2,672	--	5,836	88,612	26,791

1/ International 1/4-inch rule.

2/ Includes particleboard and waferboard bolts.

3/ Less than 500 cubic feet.

Table 55.--Annual mortality of growing stock on commercial forest land by softwoods and hardwoods, Southwest Unit, Wisconsin, 1967 and 1982

(In thousand cubic feet)

Species	1967	1982
Softwoods	188	114
Hardwoods	7,219	16,889
Total	7,407	17,003

Table 56.--Annual mortality of growing stock on commercial forest land by species group and cause, Southwest Unit, Wisconsin, 1982

(In thousand cubic feet)

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	59	--	--	--	--	--	--	59
Red pine	--	--	--	--	--	--	--	--
White pine	48	14	1	--	--	--	--	33
White spruce	2	--	--	--	--	--	--	2
Black spruce	2	--	--	--	--	--	--	2
Balsam fir	3	--	--	--	--	--	--	3
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	--	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	114	14	1	--	--	--	--	99
Hardwoods								
White oak	874	--	47	2	--	64	12	749
Select red oak	2,197	--	118	--	32	293	2	1,752
Other red oak	1,183	--	16	--	--	159	--	1,008
Select hickory	111	--	--	--	--	39	--	72
Other hickory	79	--	--	--	--	--	--	79
Basswood	394	--	27	--	3	17	--	347
Beech	--	--	--	--	--	--	--	--
Yellow birch	3	--	--	--	--	--	--	3
Hard maple	331	--	16	--	--	73	--	242
Soft maple	407	--	4	--	--	28	--	375
Elm	6,187	19	5,146	--	--	69	23	930
Black ash	43	--	--	--	--	--	--	43
White & green ash	146	--	22	2	--	--	15	107
Cottonwood	80	--	--	--	--	2	--	78
Willow	112	--	3	--	--	--	--	109
Hackberry	17	--	--	--	--	--	--	17
Balsam poplar	--	--	--	--	--	--	--	--
Bigtooth aspen	1,845	--	102	--	--	78	--	1,665
Quaking aspen	1,777	--	156	--	9	56	--	1,556
Paper birch	335	--	66	--	--	41	42	186
River birch	68	--	--	2	--	--	--	66
Black cherry	299	--	12	--	15	2	--	270
Black walnut	79	--	1	--	1	--	--	77
Butternut	290	--	99	--	--	--	--	191
Other hardwoods	32	--	7	--	--	1	2	22
Total	16,889	19	5,842	6	60	922	96	9,944
All species	17,003	33	5,843	6	60	922	96	10,043

Table 57.--Annual mortality of sawtimber on commercial forest land by species group and cause, Southwest Unit, Wisconsin, 1982

(In thousand board feet)[1/]

Species group	All causes	Cause						
		Insects	Disease	Fire	Animals	Weather	Suppression	Unknown and other
Softwoods								
Jack pine	99	--	--	--	--	--	--	99
Red pine	--	--	--	--	--	--	--	--
White pine	187	53	4	--	--	--	--	130
White spruce	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	1	--	--	--	--	--	--	1
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	287	53	4	--	--	--	--	230
Hardwoods								
White oak	2,197	--	113	--	2	292	--	1,790
Select red oak	9,405	--	444	--	159	1,432	4	7,366
Other red oak	4,303	--	62	--	--	677	--	3,564
Select hickory	260	--	2	--	--	5	--	253
Other hickory	6	6	--	--	--	--	--	--
Basswood	1,298	--	133	--	5	--	--	1,160
Beech	--	--	--	--	--	--	--	--
Yellow birch	4	--	--	--	--	--	--	4
Hard maple	896	--	81	--	--	347	--	468
Soft maple	1,065	--	15	--	--	119	--	931
Elm	20,754	82	16,288	--	--	247	--	4,137
Black ash	144	--	--	--	--	--	--	144
White & green ash	376	--	114	--	--	--	--	262
Cottonwood	177	--	--	--	--	6	--	171
Willow	321	--	11	--	--	--	--	310
Hackberry	73	--	--	--	--	--	--	73
Balsam poplar	--	--	--	--	--	--	--	--
Bigtooth aspen	4,838	--	249	--	--	371	--	4,218
Quaking aspen	1,982	--	47	--	--	192	--	1,743
Paper birch	477	--	2	--	--	125	--	350
River birch	102	--	--	3	--	--	--	99
Black cherry	238	--	49	--	--	--	--	189
Black walnut	276	--	9	--	8	--	--	259
Butternut	475	--	123	--	--	--	--	352
Other hardwoods	31	--	13	--	--	--	--	18
Total	49,698	88	17,755	3	174	3,813	4	27,861
All species	49,985	141	17,759	3	174	3,813	4	28,091

[1/] International 1/4-inch rule.

Table 58.--Annual mortality of growing stock and sawtimber on commercial forest land by county and softwoods and hardwoods, Southwest Unit, Wisconsin, 1982

County	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			Thousand board feet[1]		
Buffalo	1,771	--	1,771	5,510	--	5,510
Crawford	1,754	--	1,754	4,922	--	4,922
Dunn	1,614	52	1,562	4,772	99	4,673
Grant	1,579	--	1,579	4,609	--	4,609
Iowa	515	20	495	1,569	119	1,450
La Crosse	1,445	18	1,427	3,462	--	3,462
Lafayette	344	--	344	1,364	--	1,364
Pepin	590	--	590	2,333	2	2,331
Pierce	872	--	872	2,742	--	2,742
Richland	1,346	--	1,346	4,327	--	4,327
St. Croix	702	2	700	1,347	--	1,347
Sauk	1,888	20	1,868	5,176	53	5,123
Trempealeau	919	--	919	2,593	--	2,593
Vernon	1,664	2	1,662	5,259	14	5,245
All counties	17,003	114	16,889	49,985	287	49,698

[1] International 1/4-inch rule.

Table 59.--Annual mortality of growing stock and sawtimber on commercial forest land by ownership class and softwoods and hardwoods, Southwest Unit, Wisconsin, 1982

Ownership class	Growing stock			Sawtimber		
	All species	Softwoods	Hardwoods	All species	Softwoods	Hardwoods
	Thousand cubic feet			Thousand board feet[1]		
National Forest	--	--	--	--	--	--
Miscellaneous federal	687	--	687	2,004	--	2,004
State	466	--	466	1,349	--	1,349
County and municipal	39	--	39	159	--	159
Indian	--	--	--	--	--	--
Forest industry	--	--	--	--	--	--
Farmer	11,961	80	11,881	36,702	229	36,473
Misc. private-corp.	626	3	623	1,363	5	1,358
Misc. private-indiv.	3,224	31	3,193	8,408	53	8,355
All owners	17,003	114	16,889	49,985	287	49,698

[1] International 1/4-inch rule.

Table 60.--Output of timber products by product, softwoods and hardwoods, and source of material, Southwest Unit, Wisconsin, 1981

Product	Standard units	Total		Roundwood products				Plant byproducts	
				Growing stock		Non-growing stock			
		No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet	No. of units	Thousand cubic feet
Pulpwood[1]									
Softwoods	Standard[2]	20,933	1,648	13,059	1,028	7,457	587	417	33
Hardwoods	cords	51,817	4,077	3,281	246	813	61	47,723	3,770
Total		72,750	5,725	16,340	1,274	8,270	648	48,140	3,803
Saw logs									
Softwoods	Thousand[3]	4,002	682	1,555	265	2,447	417	--	--
Hardwoods	board feet	108,379	18,957	100,541	17,586	7,838	1,371	--	--
Total		112,381	19,639	102,096	17,851	10,285	1,788	--	--
Veneer logs									
Softwoods	Thousand[3]	--	--	--	--	--	--	--	--
Hardwoods	board feet	3,566	574	3,218	518	348	56	--	--
Total		3,566	574	3,218	518	348	56	--	--
Fuelwood									
Softwoods	Standard[2]	5,439	382	--	--	2,969	209	2,470	173
Hardwoods	cords	415,455	29,056	41,599	2,909	320,735	22,429	53,121	3,718
Total		420,894	29,438	41,599	2,909	323,704	22,638	55,591	3,891
Posts									
Softwoods	Thousand	1,104	1,134	750	770	354	364	--	--
Hardwoods	pieces	367	367	229	229	138	138	--	--
Total		1,471	1,501	979	999	492	502	--	--
Poles									
Softwoods	Pieces	--	--	--	--	--	--	--	--
Hardwoods		--	--	--	--	--	--	--	--
Total		--	--	--	--	--	--	--	--
Other[4]									
Softwoods	Thousand	105	105	--	--	--	--	105	105
Hardwoods	cubic feet	3,075	3,075	709	709	26	26	2,340	2,340
Total		3,180	3,180	709	709	26	26	2,445	2,445
All products									
Softwoods	Thousand	--	3,951	--	2,063	--	1,577	--	311
Hardwoods	cubic feet	--	56,106	--	22,197	--	24,081	--	9,828
Total		--	60,057	--	24,260	--	25,658	--	10,139

[1] Includes roundwood and plant byproducts used for particleboard and waferboard.

[2] 128 cubic feet; includes wood, bark, and air space.

[3] International 1/4-inch rule.

[4] Other (industrial production) includes cabin logs, charcoal wood, shingle bolts, pilings, etc.

Table 61.--Output of roundwood products by product, softwoods and hardwoods, and source of material, Southwest Unit, Wisconsin, 1981

(In thousand cubic feet)

Product and species group	All sources	Growing-stock trees			Rough and rotten trees	Salvable dead trees	Other sources
		Total	Sawtimber	Poletimber			
Industrial products							
Saw logs							
Softwoods	682	265	252	13	35	104	278
Hardwoods	18,957	17,586	16,087	1,499	309	666	396
Subtotal	19,639	17,851	16,339	1,512	344	770	674
Veneer logs and bolts							
Softwoods	--	--	--	--	--	--	--
Hardwoods	574	518	518	--	56	--	--
Subtotal	574	518	518	--	56	--	--
Pulpwood[1/]							
Softwoods	1,615	1,028	475	553	83	155	349
Hardwoods	307	246	75	171	11	6	44
Subtotal	1,922	1,274	550	724	94	161	393
Cooperage							
Softwoods	--	--	--	--	--	--	--
Hardwoods	107	94	94	--	8	--	5
Subtotal	107	94	94	--	8	--	5
Piling							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
Poles							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
Mine timbers (Round)							
Softwoods	--	--	--	--	--	--	--
Hardwoods	--	--	--	--	--	--	--
Subtotal	--	--	--	--	--	--	--
Posts (Round and split)							
Softwoods	1,134	770	205	565	46	--	318
Hardwoods	367	229	96	133	69	--	69
Subtotal	1,501	999	301	698	115	--	387
Other							
Softwoods	--	--	--	--	--	--	--
Hardwoods	628	615	447	168	5	4	4
Subtotal	628	615	447	168	5	4	4
All industrial products							
Softwoods	3,431	2,063	932	1,131	164	259	945
Hardwoods	20,940	19,288	17,317	1,971	458	676	518
Total	24,371	21,351	18,249	3,102	622	935	1,463
Fuelwood							
Softwoods	209	--	--	--	--	29	180
Hardwoods	25,338	2,909	1,801	1,108	576	10,084	11,769
Total	25,547	2,909	1,801	1,108	576	10,113	11,949
All products							
Softwoods	3,640	2,063	932	1,131	164	288	1,125
Hardwoods	46,278	22,197	19,118	3,079	1,034	10,760	12,287
Total	49,918	24,260	20,050	4,210	1,198	11,048	13,412

[1/] Includes particleboard and waferboard bolts.

Table 62.--Timber products from roundwood by species group and product, Southwest Unit, Wisconsin, 1981

Species group	All products	Pulpwood[1]		Saw logs		Veneer logs	
	Thousand cubic feet	Standard cords[2]	Thousand cubic feet	Thousand board feet[3]	Thousand cubic feet	Thousand board feet[3]	Thousand cubic feet
Softwoods							
Jack pine	491	5,243	412	109	23	--	--
Red pine	2,344	13,626	1,077	486	81	--	--
White pine	792	1,584	122	3,404	578	--	--
White spruce	1	12	1	--	--	--	--
Black spruce	1	22	1	1	[4]	--	--
Balsam fir	11	29	2	--	--	--	--
Hemlock	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--
Northern white-cedar	[4]	--	--	2	[4]	--	--
Other softwoods	--	--	--	--	--	--	--
Total	3,640	20,516	1,615	4,002	682	--	--
Hardwoods							
White oak	6,165	533	42	16,389	2,868	172	26
Select red oak	13,692	1,005	79	44,824	7,852	1,926	314
Other red oak	6,016	441	35	19,697	3,450	847	138
Hickory	445	--	--	1,000	178	--	--
Basswood	1,240	149	12	5,958	1,063	171	28
Beech	--	--	--	--	--	--	--
Yellow birch	6	--	--	5	1	--	--
Hard maple	2,047	313	24	6,752	1,125	132	19
Soft maple	1,245	341	24	2,773	492	75	12
Elm	9,459	406	28	3,981	709	136	21
Ash	976	121	7	1,726	303	57	8
Cottonwood	140	26	2	421	74	49	8
Balsam poplar	14	--	--	81	14	--	--
Bigtooth aspen	1,517	303	21	2,006	348	1	[4]
Quaking aspen	1,030	206	15	1,361	236	--	--
Paper birch	423	206	16	256	42	--	--
Black walnut	187	--	--	484	83	--	--
Other hardwoods[5]	1,676	44	2	665	119	--	--
Total	46,278	4,094	307	108,379	18,957	3,566	574
All species	49,918	24,610	1,922	112,381	19,639	3,566	574

(Table 62 continued on next page)

[1] Includes particleboard and waferboard bolts.

[2] 128 cubic feet; includes wood, bark, and air space.

[3] International 1/4-inch rule.

[4] Less than 500 cubic feet.

[5] Includes butternut and black cherry.

(Table 62 continued)

Species group	Fuelwood		Posts		Poles		Other products
	Standard cords [2]	Thousand cubic feet	Thousand pieces	Thousand cubic feet	Pieces	Thousand cubic feet	Thousand cubic feet
Softwoods							
Jack pine	795	56	--	--	--	--	--
Red pine	732	52	1,104	1,134	--	--	--
White pine	1,307	92	--	--	--	--	--
White spruce	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--
Balsam fir	135	9	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--
Total	2,969	209	1,104	1,134	--	--	--
Hardwoods							
White oak	41,634	2,910	213	212	--	--	107
Select red oak	77,772	5,441	6	6	--	--	--
Other red oak	34,174	2,391	2	2	--	--	--
Hickory	3,800	267	--	--	--	--	--
Basswood	1,978	137	--	--	--	--	--
Beech	--	--	--	--	--	--	--
Yellow birch	89	5	--	--	--	--	--
Hard maple	12,565	879	--	--	--	--	--
Soft maple	8,620	603	--	--	--	--	114
Elm	124,334	8,701	--	--	--	--	--
Ash	9,425	658	--	--	--	--	--
Cottonwood	834	56	--	--	--	--	--
Balsam poplar	--	--	--	--	--	--	--
Bigtooth aspen	11,563	809	87	88	--	--	251
Quaking aspen	7,847	549	59	59	--	--	171
Paper birch	4,789	333	--	--	--	--	32
Black walnut	1,489	104	--	--	--	--	--
Other hardwoods [5]	21,421	1,495	--	--	--	--	60
Total	362,334	25,338	367	367	--	--	735
All species	365,303	25,547	1,471	1,501	--	--	735

[2] 128 cubic feet; includes wood, bark, and air space.

[5] Includes butternut and black cherry.

Table 63.--Volume of primary plant residue by use and type of residue, Southwest Unit, Wisconsin, 1981

(In thousand cubic feet)

Use	Wood residue							
	Total		Coarse [1]		Fine [2]		Bark [3]	
	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods	Softwoods	Hardwoods
Fiber products [4]	21.4	2,757.0	21.4	2,508.7	--	248.3	1.0	142.7
Charcoal	--	75.6	--	75.6	--	--	--	48.8
Industrial fuel	31.8	1,856.7	28.2	857.6	3.6	999.1	32.9	1,789.9
Domestic fuel	141.1	1,861.8	139.1	1,856.2	2.0	5.6	17.3	511.2
Miscellaneous [5]	105.2	2,264.4	0.2	283.9	105.0	1,980.5	16.5	1,182.6
Not used [6]	0.9	92.2	0.6	14.9	0.3	77.3	54.7	90.7
Total	300.4	8,907.7	189.5	5,596.9	110.9	3,310.8	122.4	3,765.9

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark disposal at pulpmills.

[4] For manufacture of pulp, hardboard, or roofing felt.

[5] Livestock bedding, mulch, small dimension, and specialty items.

[6] Includes residue burned as waste.

Table 64.--All live tree biomass on commercial forest land by species group and forest type, Southwest Unit, Wisconsin, 1983

(In green tons)

Species group	All types	Forest type						
		Jack pine	Red pine	White pine	Balsam fir	White spruce	Black spruce	Northern white-cedar
Softwoods								
Jack pine	520,177	416,504	71,771	--	--	--	--	--
Red pine	2,865,422	43,937	2,435,019	--	--	--	--	--
White pine	744,871	39,579	68,698	284,604	--	--	--	--
White spruce	41,524	--	41,524	--	--	--	--	--
Black spruce	26,523	--	26,523	--	--	--	--	--
Balsam fir	7,715	--	7,715	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	153,209	--	3,606	--	--	--	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	4,359,441	500,020	2,654,856	284,604	--	--	--	--
Hardwoods								
White oak	24,559,472	--	--	--	--	--	--	--
Select red oak	28,430,820	--	83,358	--	--	--	--	--
Other red oak	16,007,682	197,211	141,958	--	--	--	--	--
Select hickory	5,656,922	--	--	--	--	--	--	--
Other hickory	3,177,805	--	--	--	--	--	--	--
Basswood	7,240,955	--	--	--	--	--	--	--
Beech	--	--	--	--	--	--	--	--
Yellow birch	81,231	--	--	--	--	--	--	--
Hard maple	8,702,477	--	--	--	--	--	--	--
Soft maple	5,919,874	--	--	6,289	--	--	--	--
Elm	7,000,204	15,595	--	--	--	--	--	--
Black ash	844,652	--	--	--	--	--	--	--
White & green ash	2,611,359	--	--	--	--	--	--	--
Cottonwood	972,010	--	--	19,235	--	--	--	--
Willow	586,467	--	--	--	--	--	--	--
Hackberry	125,287	--	--	--	--	--	--	--
Balsam poplar	58,140	--	--	--	--	--	--	--
Bigtooth aspen	4,038,565	--	--	--	--	--	--	--
Quaking aspen	4,185,978	13,938	100,200	--	--	--	--	--
Paper birch	5,675,265	--	1,593	--	--	--	--	--
River birch	388,485	--	--	--	--	--	--	--
Black cherry	3,745,657	--	11,064	--	--	--	--	--
Black walnut	1,020,873	--	--	--	--	--	--	--
Butternut	2,051,221	--	--	--	--	--	--	--
Other hardwoods	1,842,965	--	180,428	--	--	--	--	--
Noncommercial species	3,423,765	--	--	--	--	--	--	--
Total	138,348,131	226,744	518,601	25,524	--	--	--	--
All species	142,707,572	726,764	3,173,457	310,128	--	--	--	--

(Table 64 continued on next page)

(Table 64 continued)

Species group	Forest type							
	Tamarack	Oak-hickory	Elm-ash-soft maple	Maple-birch	Aspen	Paper birch	Exotics	Nonstocked
Softwoods								
Jack pine	--	31,902	--	--	--	--	--	--
Red pine	--	357,868	--	28,598	--	--	--	--
White pine	--	113,842	--	216,780	2,705	--	--	18,663
White spruce	--	--	--	--	--	--	--	--
Black spruce	--	--	--	--	--	--	--	--
Balsam fir	--	--	--	--	--	--	--	--
Hemlock	--	--	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--	--	--
Eastern redcedar	--	62,761	--	78,938	2,792	5,112	--	--
Northern white-cedar	--	--	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--	--	--
Total	--	566,373	--	324,316	5,497	5,112	--	18,663
Hardwoods								
White oak	--	20,919,132	325,157	2,449,968	379,469	278,814	--	206,932
Select red oak	--	23,703,289	--	3,452,473	322,693	699,782	--	169,225
Other red oak	--	14,278,842	108,991	614,856	215,483	41,937	--	408,404
Select hickory	--	4,677,483	2,461	702,678	8,222	239,702	--	26,376
Other hickory	--	2,003,766	40,641	1,033,759	86,526	--	--	13,113
Basswood	--	2,815,868	48,698	4,244,160	86,809	22,894	--	22,526
Beech	--	--	--	--	--	--	--	--
Yellow birch	--	12,424	--	54,766	14,041	--	--	--
Hard maple	--	1,680,228	--	6,915,472	33,038	46,024	--	27,715
Soft maple	--	1,301,310	3,132,836	1,420,534	11,092	38,674	--	9,139
Elm	--	2,611,396	796,593	3,184,878	196,725	149,567	--	45,450
Black ash	--	157,859	518,746	166,537	1,510	--	--	--
White & green ash	--	620,967	556,259	1,303,710	122,242	--	--	8,181
Cottonwood	--	256,782	367,356	184,604	144,033	--	--	--
Willow	--	19,617	394,180	9,290	50,044	--	--	113,336
Hackberry	--	29,407	40,268	55,612	--	--	--	--
Balsam poplar	--	39,502	--	2,842	--	15,796	--	--
Bigtooth aspen	--	2,445,737	13,868	560,615	792,155	226,190	--	--
Quaking aspen	--	1,550,288	--	547,855	1,782,192	179,121	--	12,384
Paper birch	--	2,741,607	93,230	578,017	295,773	1,965,045	--	--
River birch	--	52,570	335,915	--	--	--	--	--
Black cherry	--	2,211,046	13,903	1,352,996	57,497	74,837	--	24,314
Black walnut	--	754,226	--	232,011	--	--	--	34,636
Butternut	--	1,156,107	30,597	809,759	15,358	--	--	39,400
Other hardwoods	--	630,090	500,810	372,202	88,313	45,120	--	26,002
Noncommercial species	--	2,007,294	30,361	1,299,373	29,904	52,709	--	4,124
Total	--	88,676,837	7,350,870	31,548,967	4,733,119	4,076,212	--	1,191,257
All species	--	89,243,210	7,350,870	31,873,283	4,738,616	4,081,324	--	1,209,920

Table 65.--All live tree biomass by species group and tree biomass component, Southwest Unit, Wisconsin, 1983

(In green tons)

Species group	All components	Biomass component				
		All live 1- to 5-inch trees	Growing stock		Cull	
			Boles	Tops and limbs	Boles	Tops and limbs
Softwoods						
Jack pine	520,177	66,916	223,787	95,745	93,642	40,087
Red pine	2,865,422	214,153	1,834,164	788,509	19,991	8,605
White pine	744,871	222,370	350,164	149,218	18,068	5,051
White spruce	41,524	31,673	6,989	2,862	--	--
Black spruce	26,523	--	18,686	7,837	--	--
Balsam fir	7,715	--	5,423	2,292	--	--
Hemlock	--	--	--	--	--	--
Tamarack	--	--	--	--	--	--
Eastern redcedar	153,209	27,592	28,419	11,538	74,215	11,445
Northern white-cedar	--	--	--	--	--	--
Other softwoods	--	--	--	--	--	--
Total	4,359,441	562,704	2,467,632	1,058,001	205,916	65,188
Hardwoods						
White oak	24,559,472	611,167	11,402,621	4,752,393	5,557,380	2,235,911
Select red oak	28,430,820	403,281	15,854,701	6,756,767	3,821,310	1,594,761
Other red oak	16,007,682	221,275	7,137,276	3,017,199	3,978,569	1,653,363
Select hickory	5,656,922	415,764	3,018,411	1,276,569	672,043	274,135
Other hickory	3,177,805	570,219	1,641,070	696,462	206,704	63,350
Basswood	7,240,955	501,012	3,618,829	1,537,650	1,132,372	451,092
Beech	--	--	--	--	--	--
Yellow birch	81,231	--	48,518	20,289	8,721	3,703
Hard maple	8,702,477	415,593	4,175,573	1,779,182	1,640,852	691,277
Soft maple	5,919,874	570,686	2,806,205	1,199,092	954,335	389,556
Elm	7,000,204	771,413	3,199,818	1,326,108	1,214,702	488,163
Black ash	844,652	97,594	460,619	192,795	66,130	27,514
White & green ash	2,611,359	237,768	1,402,008	597,478	269,971	104,134
Cottonwood	972,010	4,840	629,184	266,032	50,977	20,977
Willow	586,467	31,765	241,495	100,812	156,418	55,977
Hackberry	125,287	29,624	59,335	24,479	8,422	3,427
Balsam poplar	58,140	2,842	38,502	16,796	--	--
Bigtooth aspen	4,038,565	227,177	2,469,653	1,074,817	185,926	80,992
Quaking aspen	4,185,978	400,344	2,230,923	960,499	421,986	172,226
Paper birch	5,675,265	766,248	2,860,276	1,215,486	591,807	241,448
River birch	388,485	42,610	188,066	79,676	54,599	23,534
Black cherry	3,745,657	355,211	1,673,041	712,983	732,668	271,754
Black walnut	1,020,873	8,580	565,352	240,510	144,766	61,665
Butternut	2,051,221	55,973	751,946	320,931	649,106	273,265
Other hardwoods	1,842,965	335,960	441,683	184,875	632,931	247,516
Noncommercial species	3,423,765	--	--	--	3,079,722	344,043
Total	138,348,131	7,076,946	66,915,105	28,349,880	26,232,417	9,773,783
All species	142,707,572	7,639,650	69,382,737	29,407,881	26,438,333	9,838,971

Table 66.--Sampling errors[1/] for estimates smaller than the Unit totals of volume, net growth, removals, and area of commercial forest land, Southwest Unit, Wisconsin, 1983

Sampling error	Commercial forest land	Growing stock			Sawtimber		
		Inventory	Growth	Removals	Inventory	Growth	Removals
Percent	Thousand acres	- - - -Thousand cubic feet- - - -			- - - -Thousand board feet[2/] - - -		
1	299.1	24,168,264	1,626,313	35,432,994	100,373,122	5,368,599	98,463,036
2	74.8	6,042,066	406,578	8,858,248	25,093,280	1,342,150	24,615,759
3	33.2	2,685,363	180,701	3,936,999	11,152,569	596,511	10,940,337
4	18.7	1,510,517	101,645	2,214,562	6,273,320	335,537	6,153,940
5	12.0	966,731	65,053	1,417,320	4,014,925	214,744	3,938,521
10	3.0	241,683	16,263	354,330	1,003,731	53,686	984,630
15	1.3	107,415	7,228	157,480	446,103	23,860	437,613
20	0.7	60,421	4,066	88,582	250,933	13,421	246,158
25	0.5	38,669	2,602	56,693	160,597	8,590	157,541
50	0.1	9,667	651	14,173	40,149	2,147	39,385
100	0.0	2,417	163	3,543	10,037	537	9,846

[1/] At the 68-percent probability level.

[2/] International 1/4-inch rule.

Table 67.--Sampling errors for county totals of growing-stock volume, net growth, removals, and area of commercial forest land, Southwest Unit, Wisconsin, 1983

(Percent of estimate)

County	Commercial forest land	Growing stock		
		Inventory	Growth	Removals
Buffalo	1.26	10.81	17.66	110.93
Crawford	1.34	12.07	19.67	239.02
Dunn	1.33	11.58	17.61	132.71
Grant	1.27	11.76	18.18	164.39
Iowa	1.48	15.75	23.33	264.08
La Crosse	1.57	13.82	24.00	154.29
Lafayette	2.82	30.41	61.22	1/
Pepin	2.37	24.54	43.84	306.82
Pierce	1.72	17.24	25.95	212.40
Richland	1.37	13.14	21.45	209.01
St. Croix	2.03	20.68	24.76	140.19
Sauk	1.28	11.16	17.31	67.43
Trempealeau	1.43	13.97	20.17	172.84
Vernon	1.22	10.90	18.69	166.97
All counties	0.39	3.65	5.74	39.38

[1/] There were no average annual removals for this county.

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The timber resource of the Southwest Wisconsin Survey Unit increased 29 percent in commercial forest area and increased 52 percent in growing-stock volume between 1968 and 1983. Highlights and statistics from the fourth inventory of this unit are presented for area, volume, growth, mortality, removals, utilization, and biomass.

KEY WORDS: Statistics, area, volume, growth, mortality, removals.

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Plant Species Biomass Estimates for 13 Upland Community Types of Northeastern Minnesota

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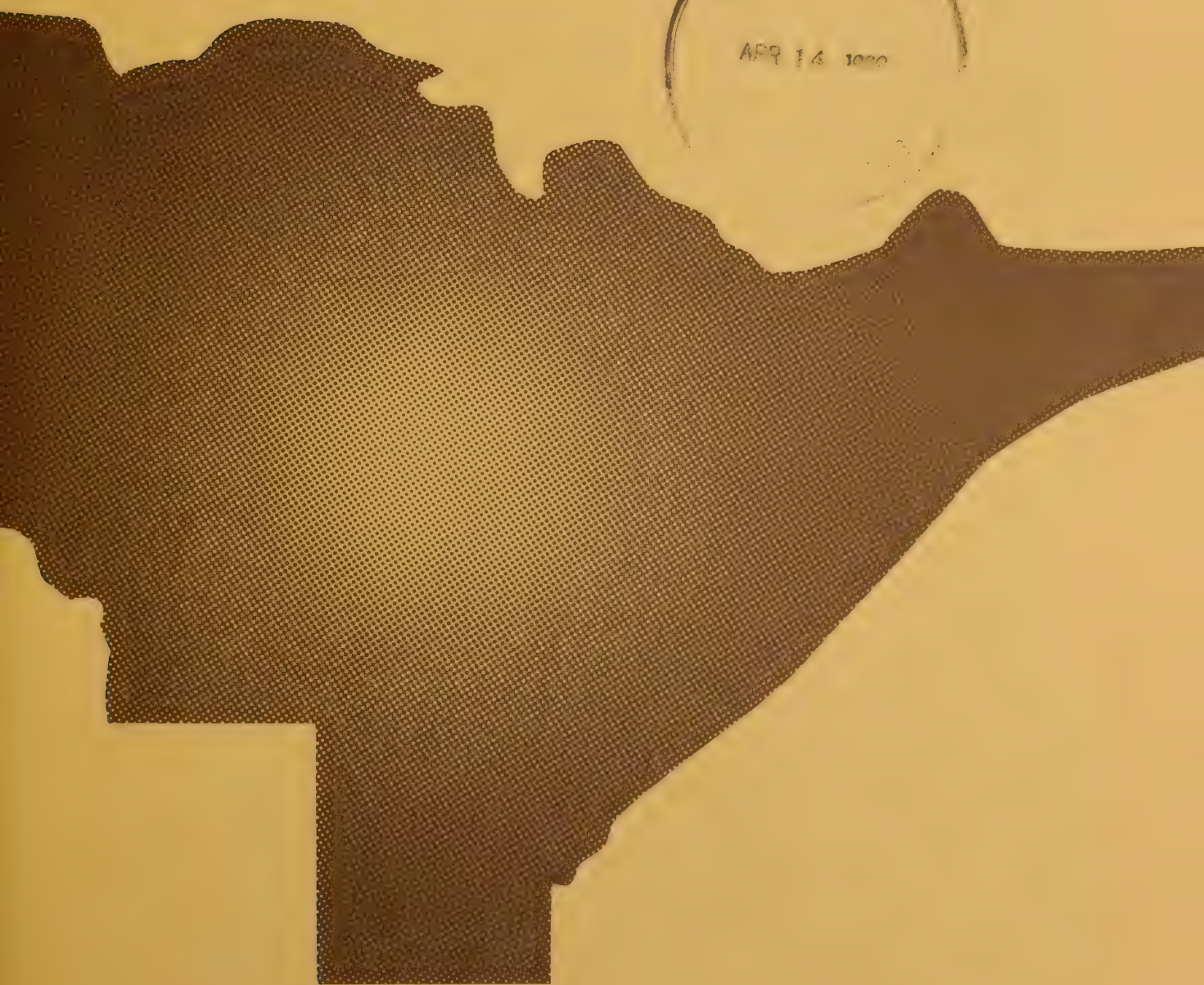

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PLANT SPECIES BIOMASS ESTIMATES FOR 13 UPLAND COMMUNITY TYPES OF NORTHEASTERN MINNESOTA

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A series of interrelated studies designed to classify, describe, and elucidate the dynamics of upland plant community types found in northeastern Minnesota has resulted in a unique phytosociological data base. The data base contains detailed information by species and vegetative strata for 13 community types—12 forest and one nonforest. The concurrent development of biomass-estimation equations for most of the species represented in the data set allowed conversion of these phytosociologic data into estimates of biomass for various stages of community development ranging from 1 year following disturbance to maturity.

THE DATA BASE

Field

The data base represented in the accompanying tables is the result of phytosociologic and biomass data collected within or near the Boundary Waters Canoe Area Wilderness (BWCAW) as part of studies of: (1) mature upland forest and rock outcrop stands that regenerated naturally following disturbance, usually wildfire (Ohmann and Ream 1971a); (2) mature upland forest stands that regenerated naturally following logging of red and white pine, usually followed by slash fires, during the 1890 to 1930 era (Grigal and Ohmann 1975); (3) 33-year-old upland forest stands regenerated naturally following summer-season wildfires in 1936 (Ohmann *et al.* 1973); (4) 1- to 30-year-old upland forest stands regenerated by planting following logging of jack pine and black spruce (Ohmann 1982, 1984); (5) 1- to 5-year-old upland forest stands that regenerated naturally following a 1971 spring-season fire (Ohmann and Grigal 1979); and (6) 1-year-old forest stands that regenerated naturally following a 1974 summer-season wildfire (Ohmann and Grigal 1981) (table 1).[1]

The sampling design for studies 1 through 4 has been reported in detail (Ohmann and Ream 1971b). Briefly, we randomly located stands by using a grid overlay on standard topographic maps. Only upland plant communities—defined as those on which surface water never accumulates—were sampled. The minimum size of a sample area was about 5 acres (2 ha) in communities with trees and about 1/40 acre (100 m^2) in communities without trees (i.e., bedrock outcrops). Only uniform sites, with no apparent discontinuities in either vegetation or topography, were selected. We used 20 points within each stand to sample the vegetation. The point-centered quarter method (Cottam and Curtis 1956) was used for trees; circular milacre plots (4 m^2) were used for tree seedlings (<1.0 in. (2.5 cm) d.b.h.) and tall shrubs; and 1 × 2-ft (0.2-m^2) rectangular plots were used for other vegetation. The sample design and vegetation descriptions for studies 5 and 6 have been reported in detail (Ohmann and Grigal 1979, 1981). Biomass values were developed directly from vegetation clipped from 6.5-ft^2 (0.6-m^2) plots established each year adjacent to permanent plots used to sample vegetation for phytosociological characteristics.

Numerical

Trees and saplings

For those studies of forest stands old enough to have saplings (1- to 4-in. (2.5 to 10 cm) d.b.h.) and trees (>4 in. (10 cm) d.b.h.), biomass estimation equations were based on the abundant recent literature (table 2). Aboveground total and foliage biomass were estimated separately for each species and summarized for each community type. For uniformity and consistency, we used the same functional relationship for all tree and sapling biomass

[1] *All tables appear at the end of the text.*

estimation equations. Because of its wide use, we selected the allometric relationship

$$y = aD^b \quad , \qquad (1)$$

where y is mass of a tree component, D is diameter at breast height (d.b.h.), and a and b are regression parameters. When available, general equations from many sites were used (e.g., Crow 1983, Schmitt and Grigal 1981). In some cases our search only indicated one set of equations for a species (e.g., black ash, (Parker and Schneider 1975)). In other cases, several equations, representing a wide geographic range, were available for a species. Regression coefficients were generally similar for a species, independent of location. We pooled the parameters for equations that were similar to arrive at a more generalized expression. The approach was similar to that used by Pastor *et al.* (1984).

The usual method of computation for point-quarter data uses stem diameter and distance from a number of points (usually 20 or more). The data are then summed over all points, and tree density and basal area are calculated on the basis of the aggregated data (Cottam and Curtis 1956). Our approach was to perform the appropriate computations for data from each point. Summary statistics, including mean and standard error (SE), could then be developed over all points. The total biomass for a stratum was the sum of the biomass for each species in the stratum.

For studies 3 and 4, all tree stems greater than 1 in. (2.5 cm) were combined; thus, there is no separate biomass estimate for saplings. In studies 5 and 6, all tree stems were classified as tree seedlings (table 1).

Tall shrubs

Biomass estimation equations for tall shrubs were also of the allometric form. They were based primarily on three studies from northern Minnesota: Balogh (1983), Grigal and Ohmann (1977), and Roussopoulos and Loomis (1979) (table 3). Equations from Telfer (1969) were used for a few less common species. For some common species, all three primary sources contained estimation equations. In those cases, all three equations were plotted and the intermediate equation was selected. Because this was often an equation from Balogh (1983), equations for less common species were also obtained from that source. All equations were based on shrub diameter at 6 in. (15 cm) above the ground.

In studies 1 through 3, tall shrubs were measured in 0.4-in. (1-cm) diameter classes at 6 in. (15 cm) above the ground (Ohmann and Ream 1971a) (table 1). However, other data (Balogh 1983) indicate that the majority of shrubs in smaller size classes are near the lower end of these classes. Use of the allometric function based on 0.4-in. (1-cm) diameter classes would therefore overestimate shrub biomass. We determined diameter-density distributions for each shrub species in studies 1 through 3. The data were fit to a linearized power function

$$\ln (De) = a + b \ln (Di) \quad , \qquad (2)$$

where ln (De) is the natural log of proportion of total stems of that diameter, and ln (Di) is the natural log of stem diameter. The slope of this equation (b) for each species is the change in proportion of individuals with diameter. Shrub data for a sampling point, in 0.4-in. (1-cm) diameter classes, and the slope (b) of the above relationship were used to compute the expected number of individuals by 0.1-in. (0.25-cm) diameter classes. In study 4 the number of shrub stems by 0.1-in. (0.25-cm) diameter classes were determined directly within each plot (table 1). The biomass estimation equations were then applied to the 0.1-in. (0.25-cm) classes. Biomass was calculated for each tall shrub species on a plot. The means of those plot values were calculated by species and summed for total biomass for the shrub stratum. In studies 5 and 6, the aboveground standing crop of vegetation was sampled during August of each year following fire (only the first year in the case of the summer-season fire, study 6). All shrub vegetation in 10 (20 in study 6) randomly located plots near the permanent sample plots within each stand was clipped at ground level (table 1). All harvested shrub vegetation was returned to the laboratory, sorted, counted, and bagged by species and plot, dried to 70° C to constant weight, and weighed. Means and variances of the samples were calculated for all species in each stand.

Tree seedlings

Tree seedling cover and density were recorded in studies 1 through 4 (table 1). Most published biomass estimation equations for seedlings are based on either diameter (Telfer 1969, Roussopoulos and Loomis 1979) or height (Young *et al.* 1980). We modified the published equations to determine biomass for seedlings from our data.

Our independent variable was cover per individual seedling. We collected samples to determine minimum and maximum biomass and cover for representative deciduous (northern red oak, red maple, quaking aspen, and paper birch) and coniferous (balsam fir, black spruce, jack pine, and white pine) species that were most common as seedlings in the data set.

Relationships from both Roussopoulos and Loomis (1979) and Young *et al.* (1980) were used to determine change in mass with size. Biomass estimation equations of the allometric form were then developed for both foliage mass and for total mass, using

cover per individual as the independent variable. In studies 1 through 4, seedling biomass for a stand was calculated similarly to that for tall shrubs. In studies 5 and 6, biomass was determined by clipping and weighing as for tall shrubs (table 1).

Herbs and low shrubs

A series of biomass equations using cover as the independent variable has been developed for herbs, ferns, and low shrubs sampled on 1 × 2-ft (0.2-m^2) plots (Ohmann *et al*. 1981) (table 1). These equations were used for the data from studies 1 through 4. For species for which no equation had been specifically developed, we used equations for similar species (e.g., *Fragaria* spp. equation for *Waldsteinia fragarioides* (Michx.) Tratt.). A miscellaneous herb and fern equation (unpublished) was used for species with no obvious morphological match. For each species, stand biomass was simply the mean of the estimates for each plot (usually 20), and standard error was calculated. Stand totals over all species were calculated as with the other strata. Biomass for studies 5 and 6 was obtained by clipping plots exactly as for shrubs and tree seedlings (table 1).

Mosses and lichens

Cover estimates for both mosses and lichens were also made on 1 × 2-ft (0.2-m^2) plots in studies 1 through 3 (table 1). Based on sampling in northeastern Minnesota, we determined mass per unit area for various moss and lichen species and species groups (Ohmann and Grigal, 1985). These data were then converted to linear relationships between cover and mass on 1 × 2-ft (0.2-m^2) plots. Means and errors were calculated as for the herb stratum. The values obtained are within the range of those reported for jack pine stands on shallow soils in the area (Green and Grigal 1979). Moss and lichen cover was not estimated in study 4 (table 1). In studies 5 and 6, moss and lichen biomasses were determined from the clip plots exactly like those for the other vegetation (table 1).

Each immature stand comprising studies 2 through 6 was assigned to one of 12 forest community types using a classification technique applied earlier to stands in studies 1 and 2 (Grigal and Ohmann 1975). The assignment was made by multiplying the frequency of occurrence of each of the 53 indicator species present in a stand by a classification function for that species (table 4). The sum of those products together with the appropriate constant (table 4) indicated a stand's affinity to each of the 12 community types. Stands were assigned to the community type for which they showed the greatest affinity. The assignment of stands only 1 year from fire or logging disturbance, as well as those 33 years from disturbance was possible because the majority of the 53 indicator species are neither tree nor disturbance-related species.

Tables 5-17 present the estimated aboveground ovendry biomass by species and stratum for each of the 13 community types. Means and standard errors are presented except where a species occurred in only one stand of a community type.

Thirteen community types were recognized in the initial floristic classification (Grigal and Ohmann 1975). The *lichen* community type consists of lichen-covered bedrock outcrops on ridgetops and upper slopes. Although overstory trees are absent, the type contains a few woody seedlings and tall shrubs, and some low shrubs and herbs. The remaining 12 types are forested. The *jack pine-oak* community type occurs in similar physiographic situations as the lichen type, except that sufficient soil is present to support a forest community. The community is dominated by jack pine, with some northern red oak and red maple. Where these stands have been severely disturbed by logging and fire, the coniferous component has been markedly reduced, giving rise to the *maple-oak* community type. Red maple and northern red oak dominate the overstory in this type, but the understory is similar to that in the jack pine-oak type.

Two other community types are dominated by jack pine. The *jack pine-fir* type is on deep soils, and has an overstory of jack pine with balsam fir, paper birch, and black spruce saplings and seedlings. A tall shrub layer is common, and mountain maple and fly honeysuckle are important. Large-leaf aster dominates the herb layer, but a variety of other herbs occur in the type. The *jack pine-black spruce* type, as the name implies, contains an overstory of jack pine with black spruce trees, saplings, and seedlings. Tall shrubs are rare, and moss species rather than herbaceous species dominate the forest floor. In the *black spruce-feather moss* community type, black spruce dominates the overstory although some jack pine is present. Shrubs and herbs are less common than in the previous type, and the moss layer covers the entire forest floor.

Four types are partially to completely dominated by quaking aspen and paper birch. The *aspen-birch* community type is dominated by those two species, although balsam fir seedlings are abundant. Tall shrubs are plentiful, dominated by beaked hazel. Low shrubs, especially bush honeysuckle are also abundant. Large-leaf aster is an important herb species, along with false lily-of-the-valley, wild sarsaparilla, and bunchberry. Mosses are unimportant. The *aspen-birch-white pine* community type is similar to the aspen-birch type, but it contains a component of large white pine and a greater abundance of

balsam fir in the overstory. The *maple-aspen-birch* community type contains red maple, especially as a seedling, in addition to quaking aspen and paper birch. Tall shrubs include green alder and mountain maple, in addition to beaked hazel. The type also contains balsam fir, but that species is more important in the *maple-aspen-birch-fir* community type. The type is similar to the maple-aspen-birch type, but mountain maple is more dominant as a tall shrub, low shrubs are less frequent, and bunchberry is the most common herb.

Both the conifer and the broadleaf types previously mentioned appear to occur in a successional sequence to the *fir-birch* community type. Balsam fir is the most common tree, with both paper birch and northern white-cedar as associates. Mountain maple is the dominant tall shrub, and low shrubs are sparse. The herb layer is much reduced compared to the broadleaf types, with bunchberry the most abundant herb. With the decline of the herb stratum, mosses are more abundant. The *white-cedar* community type appears to be even further along the successional sequence than the fir-birch type, and the stands in this type are somewhat older than those in the previously mentioned types. The type is similar to the fir-birch type, but northern white-cedar is more important and the herb stratum is more mixed. Bishop's cap is a common herb.

The final type, *red pine* does not fit well in sequence with the other types. It consists of old-growth red pine with a poorly developed understory resulting in open, nearly park-like stands. White pine is a common associated species. Low ericaceous shrubs are common, as are mosses and lichens.

The validity of our results is predicated in part on the generality of biomass estimation equations. Such generality across sites and even across regions has been examined for trees, and relations between diameter and total aboveground biomass are very consistent for a number of species included in our data set. These species include red maple (Crow 1983), paper birch (Schmitt and Grigal 1981), jack pine (Green and Grigal 1978), black spruce (Grigal and Kernik 1984), red pine (Alban and Laidly 1982), and quaking aspen, white pine, and northern red oak (Pastor *et al*. 1984). These results lend credence to our approach. Extensive tests of generality have not been conducted for most species in the lower forest strata, but in this study most of those equations were derived from data collected in or near the BWCAW.

Biomass productivity and the dynamic biomass relations among and within community types represented by the estimates reported here, along with their wildlife implications, have been discussed elsewhere (Grigal *et al*. 1976; Grigal and Ohmann 1977; Ohmann *et al*. 1976, 1978; Ohmann and Grigal 1977, 1979, 1981, accepted; Ohmann 1982, 1984).

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Table 1.--Type and source of data used to develop biomass estimates for species and stratum for 13 plant community types of northeastern Minnesota

	Prayer Lake Fire	Little Sioux Fire	Isabella Plantations	Cherokee-Frost Lake	BWCAW[1/]
Age (years)	1	1-5	1-30	33	mature
Number of stands sampled	2	7	53	35	121
Tree foliage & total aboveground biomass	None	None	Stems >1 in. d.b.h. on 20 plotless points	Trees >4 in. d.b.h. 20 plotless points. Saplings 1-4 in. d.b.h. on 20 plotless points	
Tree seedling foliage & total aboveground biomass	Stems clipped in 20 6.5-ft^2 plots	Stems clipped in 10 6.5-ft^2 plots	Percent cover of seedlings <1 in. d.b.h. on 20 milacre plots		
Tall shrub foliage & total aboveground biomass	Stems clipped in 20 6.5-ft^2 plots	Stems clipped in 10 6.5-ft^2 plots	Stems tallied in 0.1 in. diameter classes at 6 in. aboveground in 10 milacre plots	Stems tallied in 0.4 in. diameter classes at 6 in. aboveground in 20 milacre plots	
Herb (foliage) & low shrub (total) biomass	Stems clipped in 20 6.5-ft^2 plots	Stems clipped in 10 6.5-ft^2 plots	Species percent ground cover on 20 2-ft^2 plots		
Moss & lichen foliage biomass	Clipped in 20 6.5 ft^2 plots	Clipped in 10 6.5-ft^2 plots	Not collected	Species percent ground cover on 20 2-ft^2 plots	

[1/] Boundary Waters Canoe Area Wilderness

Table 2.--Source of biomass estimation equations used for tree and sapling strata

Species	Source
Abies balsamea	Baskerville (1965) Ker (1980) Young *et al.* (1980)
Acer rubrum	Crow (1983)
Betula papyrifera	Schmitt and Grigal (1981)
Fraxinus nigra	Parker and Schneider (1975)
Larix laricina	Young *et al.* (1980)
Picea glauca	Harding (1982) Ker (1980) Young *et al.* (1980)
Pinus banksiana	Green and Grigal (1978)
Picea mariana	Barney *et al.* (1978) Grigal and Kernik (1983) Ker (1980)
Pinus resinosa	Alban (personal communication 1982) Ker (1980) Young *et al.* (1980)
Pinus strobus	Kinerson and Bartholomew (1977) Monteith (1979) Young *et al.* (1980)
Populus balsamifera	Bella and De Franceschi (1980)
Populus grandidentata	Koerper and Richardson (1980)
Populus tremuloides	Ker (1980) Pastor and Bockheim (1981) Pollard (1972)
Prunus pensylvanica	Young *et al.* (1980)
Quercus rubra	Monteith (1979) Whittaker and Woodwell (1968)
Sorbus americana (*Prunus pensylvanica* eq.)	Young *et al.* (1980)
Thuja occidentalis	Young *et al.* (1980)
Tilia americana	Koerper and Richardson (1980)

Table 3.--Source of biomass estimation equations used for tall shrub data

Species	Source
Acer spicatum	Balogh (1983)
Alnus crispa	Balogh (1983)
Alnus rugosa	Grigal and Ohmann (1977)
Amelanchier spp.	Balogh (1983)
Comptonia peregrina	Telfer (1969)
Cornus rugosa	Balogh (1983)
Cornus stolonifera	Balogh (1983)
(*C. alternifolia* eq.)	
Corylus cornuta	Balogh (1983)
Diervilla lonicera	Roussopoulos and Loomis (1979)
Juniperus communis	Roussopoulos and Loomis (1979)
(*Abies balsamea* eq.)	
Ledum groenlandicum	Telfer (1969)
Lonicera canadensis	Roussopoulos and Loomis (1979)
Lonicera hirsuta	Grigal and Ohmann (1977)
Lonicera oblongifolia	Grigal and Ohmann (1977)
Lonicera villosa	Grigal and Ohmann (1977)
(*L. hirsuta* eq.)	
Prunus pensylvanica	Grigal and Ohmann (1977)
Prunus pumila	Roussopoulos and Loomis (1979)
(*Lonicera canadensis* eq.)	
Prunus virginiana	Balogh (1983)
Rhus glabra	Roussopoulos and Loomis (1979)
(*Sorbus americana* eq.)	
Ribes spp.	Grigal and Ohmann (1977)
Rosa acicularis	Roussopoulos and Loomis (1979)
Salix spp.	Balogh (1983)
Sambucus spp.	Roussopoulos and Loomis (1979)
(*Sorbus americana* eq.)	
Sorbus americana	Roussopoulos and Loomis (1979)
Spiraea spp.	Telfer (1969)
Taxus canadensis	Roussopoulos and Loomis (1979)
(*Abies balsamea* eq.)	
Viburnum edule	Grigal and Ohmann (1977)
(*Prunus pensylvanica* eq.)	
Viburnum rafinesquianum	Balogh (1983)

Table 4.--Classification functions to assign stands into appropriate community types identified in northeastern Minnesota

Indicator species	Aspen-birch-white pine	Aspen-birch	Fir-birch	Maple-aspen-birch	Maple-aspen-fir-birch	Jack pine-oak	Maple-oak	Red pine	Jack pine-fir	Jack pine-black spruce	Black spruce-feather moss	White-cedar
Calliergonella schreberi	-0.0903	-0.3780	0.4420	-0.3151	-0.1918	0.7837	-0.1613	0.3761	0.5763	0.8901	0.6096	0.5268
Cladonia rangiferina	-.5135	-.3474	-.1928	-.4610	-.3965	1.0937	-.1477	.5622	.2689	.4101	.2332	.0972
Cladonia mitis	1.9893	1.7868	1.9739	1.7460	1.7808	5.2556	1.0476	3.0162	1.4204	2.0224	2.1997	2.3909
Dicranum spp.	.4911	.6014	.0936	.6518	.5317	.2368	.3632	.5081	-.0822	-.0415	.1361	-.0051
Polytrichum spp.	-.1437	.0408	-.3713	-.6958	-.6645	.1193	-.2392	-.3610	-.0730	-.3058	-.2431	-.7975
Lycopodium clavatum	.2853	.5116	-.5188	.5444	.2552	-.9534	.1986	.1467	-.4872	-.7065	-.4886	-1.0251
Lycopodium obscurum	-.2733	-.2544	.0046	-.6757	-.5490	1.1345	-.7151	.0516	.2200	.3213	.2377	.2515
Pteridium aquilinum	1.1561	2.0336	.6038	1.2004	.8902	-.4636	.1076	-.1221	.0251	-.4114	.1180	.2706
Aralia nudicaulis	.5007	.4640	.4214	.6571	.5342	-.4128	.4383	.0346	.0948	-.0386	.0906	.5845
Aster macrophyllus	.3937	.3140	.3009	.2752	.1454	.1637	.1270	.1210	.3674	.2065	.2273	.2680
Clintonia borealis	.1203	.1635	-.2513	.2787	.1466	-.4605	.2806	-.0417	-.2182	-.4093	-.3847	-.4070
Cornus canadensis	-.6736	-.6169	.0637	-.7038	-.4629	-.4501	-.4111	-.6665	.0449	-.0603	-.1008	.4459
Fragaria vesca	.2479	.5703	-.1717	.1779	-.0076	-.3006	-.0134	-.0585	-.2226	-.5241	-.3371	-.3225
Galium triflorum	1.6988	1.7966	-.3324	1.5242	.8675	-.2394	.7194	1.0174	-.2504	-.5315	-.3036	-1.1082
Linnaea borealis	-.3621	-.2291	.2201	-.5033	-.3464	.2727	-.4541	-.3646	.1625	.1738	.2060	.4318
Maianthemum canadense	.2499	-.0182	-.1599	.2712	.2165	.0724	.3460	.2722	-.0597	.0722	-.0241	-.3332
Melampyrum lineare	1.1665	.9151	.3369	1.3177	1.0240	.5606	.9463	1.2092	.3502	.3633	.4160	.0566
Mitella nuda	-.3069	-.4460	.7263	-.2426	.0888	.4828	-.0429	-.1122	.4573	.5915	.5013	2.0189
Trientalis borealis	-.9979	-.8824	-.2187	-.9076	-.6809	.3780	-.3989	-.4890	-.0283	.0838	.0229	.3994
Viola spp.	-1.3748	-1.4491	-.0920	-1.4095	-.8465	.4470	-.5823	-.6440	.0837	.2571	.0473	.5383
Streptopus roseus	.8397	.9342	-.0201	.5864	.2956	-.0739	.0112	.6923	-.1136	-.0439	.0656	-.9285
Gaultheria procumbens	-.4103	-.0873	-.2856	-.9505	-.8432	1.5910	-.5420	.1742	-.0706	-.0830	-.0059	-.2154
Rubus strigosus	-1.0433	-.8948	.5142	-.8499	-.3914	.8119	-.4625	-.2654	.4621	.8624	.6421	.8716
Rubus pubescens	-.3224	-.1877	.0386	-.9632	-.7938	.9043	-.7115	-.3015	.3147	.2474	.2350	.2965
Vaccinium angustifolium	-.9636	-1.1873	-.1084	-.9776	-.5946	1.0526	-.3206	.1780	-.0036	.4432	.1920	.2742
Vaccinium myrtilloides	-.5944	-.5888	-.3624	-.5836	-.5765	-1.8859	-.2530	-1.3408	-.2126	-.5522	-.6119	-.2892
Diervilla lonicera	.3362	.6351	.1233	.2976	.2004	.2402	.0364	.0336	.1098	-.1196	.0456	.0255
Abies balsamea (S)1/	.3263	.2547	.2153	.3348	.3325	-.0484	.1863	.0984	-.0488	-.0088	.1438	.2333
Acer rubrum (S)	-.0265	-.1992	-.0292	.7124	.7136	-.2496	.5497	.3272	-.1400	.0462	-.1130	-.0030
Betula papyrifera (S)	-.0794	-.3542	.3245	-.2873	-.0530	.2134	-.1346	-.0976	.2301	.3138	.2903	.6389
Picea glauca (S)	.5360	.2296	-.0702	.1008	-.1386	.2511	-.0216	.5873	.2073	.1991	.2149	-.3642
Picea mariana (S)	-.9088	-.9331	-.5845	-.8006	-.6463	.5108	-.2687	-.0243	-.2146	.0327	-.1835	-.4959
Pinus strobus (S)	.2888	.5700	.1181	.3669	.2153	-.5553	-.0017	-.0708	-.0382	-.1969	-.0956	-.2054
Populus tremuloides (S)	.4541	.6895	-.0240	.2672	.1329	.3265	.0349	.2952	.0136	-.1291	-.0085	-.2881
Thuja occidentalis (S)	-.1160	-.0503	.3086	.0409	.0694	-.1941	-.0611	-.0708	.1416	.0709	.1181	.8737
Quercus rubra (S)	.1265	.0537	.2032	.2732	.1046	-.7440	.3809	-.0155	-.0082	-.1401	-.0777	.1569
Acer spicatum	.1967	.1604	.5146	.5133	.5440	.0771	.4430	.3185	.2286	.2885	.3179	.6931
Alnus crispa	.0987	.4195	-.1157	.5654	.3123	-.4360	.1706	.3763	-.2503	-.2387	-.1158	-.3338
Amelanchier spp.	-.5840	-.6236	-.3453	-.7123	-.4157	.4973	-.0711	-.1733	.0696	.1564	-.0698	-.3236
Cornus rugosa	-.4043	-.3280	-.3508	-.6338	-.6781	-.1307	-.4636	-.3303	-.0917	-.1249	-.1626	-.3614
Corylus cornuta	.0022	-.0765	.2353	.0551	.0937	.2555	.0481	.1723	.1799	.3524	.2847	.3612
Lonicera canadensis	-.6864	-.8248	-.4273	-.7290	-.6125	-.1990	.0564	-.5220	-.1494	-.2195	-.4369	-.2098
Salix spp.	-.1754	-.3397	-.0480	-1.3962	-1.2092	.2529	-.7527	-1.0611	.2654	-.0766	-.0073	.3905
Populus tremuloides (T)	.7950	.7483	.1599	1.0487	.8616	-.1711	.5677	.6049	.0027	.0457	.1388	-.1579
Betula papyrifera (T)	1.1644	1.2591	.5830	1.1523	.8694	.0645	.4404	.6662	.2776	.1345	.3595	.2971
Abies balsamea (T)	.6302	.6948	.4677	.5584	.5177	.1859	.2920	.3499	.3312	.1713	.2909	.2457
Thuja occidentalis (T)	.3133	.3119	.8577	.3432	.4914	.7283	.1869	.3076	.5547	.6218	.6385	1.3728
Pinus banksiana (T)	.2012	-.0439	.1315	.2378	.2813	.1372	.2302	.2519	.3005	.4015	.1479	.1592
Picea glauca (T)	.4138	.5196	-.1152	.6869	.4432	-.8575	.2395	-.0893	-.2459	-.5936	-.3820	-.1714
Picea mariana (T)	.3650	.2754	.6489	.3673	.4928	.3494	.2426	.3848	.3844	.6265	.6685	.7407
Pinus resinosa (T)	.6742	.3823	.1344	.7702	.5826	.4093	.5975	1.2845	.1108	.2915	.2838	-.0877
Pinus strobus (T)	1.0096	.7417	.3527	.9743	.3111	.0072	.4813	.9342	.1039	.2039	.2999	.1565
Acer rubrum (T)	1.2837	1.3708	.5701	1.5662	1.2423	-.2180	.3816	.5616	.1884	-.0685	.2520	.4052
Constant	-140.9238	-152.5211	-95.9515	-169.9262	-130.0939	-205.5043	-95.6863	-154.3386	-61.7259	-90.2644	-77.3991	-179.2447

1/(T) Tree size class (≥1 in. d.b.h.)
(S) Seedling size class (<1 in. d.b.h.)

Table 5.--Aboveground ovendry biomass by species and stratum for the lichen community type of northeastern Minnesota

(In Kg/ha)
BWCAW
Mature
(n = 6)

Stratum/Species	Foliage $\bar{X}$	Foliage SE	Total $\bar{X}$	Total SE
Tree seedling				
Acer rubrum L.	0.5	-	16.0	-
Betula papyrifera Marsh.	.1	-	2.6	-
Pinus banksiana Lamb.	.6	-	4.6	4.6
Populus tremuloides Michx.	.5	-	2.8	-
Quercus rubra L.	.3	-	1.5	-
Sorbus americana Marsh.	.1	-	.7	-
Stratum Total	2.1		28.2	
Tall shrub				
Acer spicatum Lam.	<.1	-	<.1	-
Amelanchier Medic. spp.	<.1	-	.2	.2
Prunus pensylvanica L.F.	<.1	-	<.1	-
Salix bebbiana Sarg.	<.1	-	.1	-
Salix L. spp.	1.0	-	1.2	-
Stratum total	1.1		1.6	
Low shrub				
Diervilla Lonicera Mill.			54.4	53.4
Rubus strigosus Michx.			3.5	-
Vaccinium angustifolium Ait.			37.9	18.7
Stratum total			95.8	
Herb				
Anemone quinquefolia L.	<.1	-		
Aralia hispida Vent.	1.9	-		
Aralia nudicaulis L.	.2	-		
Aster macrophyllus L.	.3	-		
Carex L. spp.	5.0	2.3		
Corydalis sempervirens (L.) Pers.	.5	.3		
Goodyera tesselata Lodd.	.4	-		
Grasses	40.6	14.5		
Maianthemum canadense Desf.	.2	-		
Melampyrum lineare Desr.	.2	-		
Potentilla tridentata Soland.	.3	-		
Streptopus roseus Michx.	.2	-		
Trientalis borealis Raf.	<.1	-		
Stratum total	49.9			
Moss				
Calliergonella schreberi (Willd., BR. & Sch.) Grout	7.1	5.2		
Dicranum Hedw. spp.	2.6	-		
Polytrichum Hedw. spp.	283.2	95.3		
All other mosses	360.4	118.5		
Stratum total	653.3			
Lichen				
Cladonia mitis Sandst.	939.1	325.7		
Cladonia rangiferina (L.) Web.	1,535.1	324.2		
Peltigera aphthosa (L.) Willd.	90.2	41.8		
All other lichens	743.8	161.6		
Stratum total	3,308.2			
Community total			4,137.0	

Table 6.--Aboveground ovendry biomass by species and stratum for the aspen-birch-white pine community type of northeastern Minnesota

(In Kg/ha)

	Little Sioux Fire												Cherokee-Frost Lake				BWCAW MATURE			
	1 n = 1				3 n = 1				5 n = 1				33 n = 7				n = 16			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Tree																				
Abies balsamea (L.) Mill.													60.7	45.4	520.4	388.1	807.2	272.8	6,362.5	2,143.3
Acer rubrum L.																	5.8	3.4	208.7	127.2
Betula papyrifera Marsh.													946.0	227.8	34,570.4	9,405.4	871.0	296.3	22,483.4	7,943.6
Picea glauca (Moench) Voss.													94.1	38.0	661.4	250.9	867.4	245.3	7,979.9	2,270.7
Picea mariana (Mill.) B.S.P.													39.3	37.8	285.5	274.0	138.4	97.5	1,077.9	758.0
Pinus banksiana Lamb.													712.2	348.5	11,870.7	5,505.5	1,095.2	693.2	23,805.2	14,566.4
Pinus resinosa Ait.																	1,099.0	512.9	15,619.2	7,127.4
Pinus strobus L.													2.4	-	45.9	-	2,757.6	1,023.7	6,160.0	22,621.0
Populus grandidentata Michx.																	6.4	5.8	364.8	331.9
Populus tremuloides Michx.													919.4	246.6	29,602.5	7,576.0	643.4	161.1	33,063.2	9,535.6
Thuja occidentalis L.																	2.8	-	22.3	-
Stratum Total													2,774.1		77,556.8		8,294.2		172,147.1	
Sapling																				
Abies balsamea (L.) Mill.													12.4	10.2	109.3	89.7	196.4	95.6	1,648.6	800.8
Acer rubrum L.																	5.6	2.7	108.6	55.7
Betula papyrifera Marsh.													291.5	166.9	10,693.2	6,156.5	228.4	87.9	8,238.8	3,115.2
Picea glauca (Moench) Voss.													200.0	112.5	1,305.4	719.1	63.9	22.9	421.0	150.7
Picea mariana (Mill.) B.S.P.													33.3	-	189.8	-	37.9	21.6	224.9	130.0
Pinus banksiana Lamb.													4.5	-	47.6	-	2.7	2.0	30.2	21.8
Pinus resinosa Ait.																	6.9	-	68.4	-
Pinus strobus L.																	7.1	5.4	127.0	95.6
Populus grandidentata Michx.																	.2	-	8.5	-
Populus tremuloides Michx.													203.2	104.0	5,291.4	2,744.0	63.2	42.2	1,641.4	1,087.5
Sorbus americana Marsh.													<.1	<.1	<.1	<.1	.9	.6	9.4	6.5
Thuja occidentalis L.													39.3	36.2	153.1	144.6	.9	-	4.3	-
Stratum Total													784.3		17,789.9		614.1		12,531.1	

	Little Sioux Fire												Cherokee-Frost Lake				BWCAW MATURE			
	1 n = 1				3 n = 1				5 n = 1				33 n = 7				n = 16			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Tree Seedling																				
Abies balsamea (L.) Mill.													51.4	22.1	130.6	56.7	32.2	8.4	67.6	19.5
Acer rubrum L.			11.8		40.2		<0.1		1.5				.1	<.1	1.6	.8	.7	.3	11.2	4.5
Betula papyrifera Marsh.		45.0	50.0		104.5		261.4		1,035.4				5.4	1.3	127.2	34.4	1.7	.7	41.0	17.1
Fraxinus nigra Marsh.																	1.0	.6	7.8	6.2
Picea glauca (Moench) Voss.													30.5	12.6	63.6	27.5	5.4	1.2	9.2	2.2
Picea mariana (Mill.) B.S.P.													7.4	5.1	14.6	10.1	5.3	3.1	9.5	5.8
Pinus banksiana Lamb.		.1	.1		.1		.3		18.0				.5	.3	3.0	1.9				
Pinus resinosa Ait.									.5											
Pinus strobus L.																	.1	.1	.9	.7
Populus grandidentata Michx.			44.5		160.8				522.3				.8	-	7.3	-	1.9	.5	10.6	2.9
Populus tremuloides Michx.		1.4	56.7		169.5		174.6		1,164.4				4.3	1.6	25.0	9.9	7.4	1.7	44.8	11.8
Sorbus americana Marsh.													.6	.2	3.0	1.2	1.1	.5	5.9	2.3
Thuja occidentalis L.													18.8	12.5	52.1	34.1				
Stratum Total		46.5	165.1		475.1		436.4		2,742.1				119.8		478.0		56.8		208.5	
Tall Shrub																				
Acer spicatum Lam.													27.1	11.9	193.9	90.3	57.9	37.4	632.1	441.7
Alnus crispa (Ait.) Pursh.													.1	-	.1	-	6.6	3.0	46.6	21.2
Amelanchier Medic. spp.													.1	.1	.2	.1	6.3	3.4	65.3	32.8
Cornus rugosa Lam.													.4	.3	.8	.5	8.3	5.0	41.2	25.0
Cornus stolonifera Michx.																	.1	-	.1	-
Corylus cornuta Marsh.		9.3	383.4		1,034.5		568.2		1,733.8				90.4	38.2	633.3	263.7	60.0	13.3	354.9	86.5
Lonicera canadensis Marsh.					3.8		47.9		119.4				1.7	.6	5.5	1.9	1.5	.8	7.1	4.2
Lonicera hirsuta Eat.																	.1	.1	.1	.1
Lonicera oblongifolia (Goldie) Hook.													.1	-	.1	-				
Lonicera villosa (Michx.) R. & S.																	.1	.1	.1	.1
Prunus pensylvanica L.f.		5.4	48.8		104.9		16.2		55.9				15.2	8.3	110.9	63.2	.6	.5	3.1	2.8
Viburnum rafinesquianum Schult.																	143.3		1,164.4	
Stratum Total		14.7	432.2		1,143.2		635.3		1,909.1					151.9		1,035.2				

(Table 6 continued on next page)

(Table 6.--continued)

	Little Sioux Fire										Cherokee-Frost Lake				BWCAW MATURE n = 16			
	1 n = 1				3 n = 1				5 n = 1				33 n = 7					
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Low Shrub																				
Arctostaphylos Uva-ursi (L.) Soreng.																			0.7	-
Chimaphila umbellata (L.) Bart.			<0.1				27.8								0.9	0.5			.4	0.2
Comptonia peregrina B.&B. Small. Rydb.			.2				51.2				283.1									
Diervilla Lonicera Mill.			.7				15.5				24.8				18.3	8.7			43.0	7.1
Gaultheria procumbens L.							16.7												.8	-
Juniperus communis L.																			16.0	-
Ribes triste Pall.							.3								<.1	-				
Ribes L. spp.															.2	-			.4	-
Rosa acicularis Lindl.							14.7				26.5				2.5	1.0			3.2	1.0
Rubus parviflorus Nutt.																			6.6	3.5
Rubus pubescens Raf.			.4				6.0								5.8	2.6			1.2	.5
Rubus strigosus Michx.			239.4				264.3				207.5				4.5	2.0			2.7	1.5
Vaccinium angustifolium Ait.			2.0				7.3												3.8	1.2
Vaccinium myrtilloides Michx.			5.6								104.8				1.8	-			12.6	6.9
Stratum Total			248.4				403.8				646.7				34.1				91.4	
Herb																				
Actaea rubra (Ait.) Willd.													1.0	0.9			0.2	0.2		
Anaphalis margaritacea (L.) C.B. Clarke													3.8	1.8			.1	-		
Anemone quinquefolia L.					0.4								<.1	-			.3	.3		
Antennaria spp. Gaertn.																	.4	-		
Apocynum androsaemifolium L.													1.1	.7			.1	.1		
Aquilegia canadensis L.																	.1	-		
Aralia hispida Vent.									8.0											
Aralia nudicaulis L.	66.5				84.7				72.8				44.2	10.3			24.7	4.6		

	Little Sioux Fire										CHEROKEE-FROST LAKE				BWCAW MATURE n = 16			
	1 n = 1				3 n = 1				5 n = 1				33 n = 7					
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Asarum canadense L.																	0.5	-		
Aster ciliolatus Lindl.													0.4	0.2			1.4	0.7		
Aster macrophyllus L.	454.8				169.7				254.1				231.7	44.6			208.2	31.4		
Carex L. spp.	86.0				105.0				11.0				2.9	1.7			3.0	1.8		
Circaea alpina L.																	.3	-		
Clematis viginiana L.																	.2	-		
Clintonia borealis (Ait.) Raf.	16.3				20.4				31.6				1.6	.8			2.6	1.2		
Coptis groenlandica (Oeder) Fern.									.6				.7	-			.7	.6		
Cornus canadensis L.	47.3				101.9				262.2				14.4	5.7			6.2	1.7		
Epilobium angustifolium L.	4.0												14.9	7.5			.1	-		
Fragaria vesca L.	.9				.4				17.1				1.4	.8			7.8	2.4		
Fragaria virginiana Duchesne.																	.3	.2		
Galium triflorum Michx.	1.8								1.1				.2	.1			.7	.4		
Geranium bicknellii Britt.	32.1				9.1															
Goodyera repens (L.) R. Br.													.7	.4			.4	.2		
Goodyera tesselata Lodd.													.1	-			.2	.1		
Grasses					35.6				33.5				47.6	20.0			50.9	6.7		
Lactuca canadensis L.																	<.1	-		
Lathyrus ochroleucus Hook.													1.0	.6			3.6	1.1		
Lathyrus venosus Muhl.	.4																1.4	.9		
Linnaea borealis L.	3.9				20.0				1.3				5.6	3.3			8.1	2.2		
Maianthemum canadense Desf.	6.1				26.3				21.4				3.9	1.1			7.4	1.4		
Melampyrum lineare Desr.									.1				1.1	.7			1.4	.5		
Mitella nuda L.													.2	-			1.6	1.0		
Petasites palmatus (Ait.) Gray																	.1	-		
Petasites vitifolius Rydb.																	.5	-		
Polygala paucifolia Willd.																	.1	.1		
Polygonum cilinode Michx.	2.3				<.1															
Pyrola asarifolia Michx.																	<.1	-		
Pyrola elliptica Nutt.													.1	-			.1	.1		
Pyrola minor L.													.5	.4			<.1	-		
Pyrola rotundifolia L.													.2	.1			.4	.2		
Pyrola secunda L.	.9																.1	.1		
Pyrola virens Schweigg.																				

(Table 6 continued on next page)

(Table 6.--continued)

	Little Sioux Fire 1 n = 1				Little Sioux Fire 3 n = 1				Little Sioux Fire 5 n = 1				Cherokee-Frost Lake 33 n = 7				BWCAW MATURE n = 16			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Pyrola L. spp.					8.7				3.1											
Solidago hispida Muhl.													0.1	-						
Streptopus roseus Michx.									.6				3.0	1.5			0.3	0.3		
Taraxacum Zinn. spp.													.1	-						
Trientalis borealis Raf.	1.4				1.7				1.4				.6	.5			.1	.1		
Trifolium repens L.																	.1	-		
Trillium grandiflorum (Michx.) Salisb.																	.1			
Vicia americana Muhl.																				
Viola L. spp.	.1												.4				.2	.1		
Waldsteinia fragarioides (Michx.) Tratt.													.1				.1			
Stratum total	724.9		584.0						719.9				383.8				325.3			
Fern and fern allies																				
Botrychium virginianum (L.) Sw.																	.4			
Dryopteris spinulosa (O.F. Muell.) Watt																	.1			
Lycopodium annotinum L.													.4				.1			
Lycopodium clavatum L.													4.1	1.8			1.4	1.0		
Lycopodium complanatum L.	3.8				1.0												.1	.1		
Lycopodium lucidulum Michx.																	.1	.1		
Lycopodium obscurum L.	12.7								199.1								.1	.1		
Osmunda claytoniana L.																	.1	.1		
Polypodium virginianum L.													.1				.4	.4		
Pteridium aquilinum (L.) Kuhn.																				
Woodsia ilvensis (L.) R. Br.																	.1	-		
Stratum total	16.5												7.0				42.1			
Moss																				
Calliergonella schreberi (Willd.) Br. & Sch.) Grout																				

	Little Sioux Fire 1 n = 1				Little Sioux Fire 3 n = 1				Little Sioux Fire 5 n = 1				Cherokee-Frost Lake 33 n = 7				BWCAW MATURE n = 16			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Dicranum Hedw. spp.													29.9	13.3			25.3	9.5		
Hylocomium splendens (Hedw.) B.S.G.													1.6	-						
Hypnum crista-castrensis Hedw.													1.4	.7			1.1	.6		
Polytrichum Hedw. spp.	.1				1.1				0.5	0.5			56.0	30.1			4.2	2.0		
All other mosses	.2												104.8	33.1			268.9	57.4		
Stratum total					1.1				.5				299.9				521.1			
Lichen																				
Cladonia alpestris (L.) Rabenh.													2.3	-			21.2	20.1		
Cladonia mitis Sandst.													.8	-			6.9	3.4		
Cladonia rangiferina (L.) Web.													27.2	21.2						
Cladonia sylvatica (L.) Hoffm.													15.1	-						
Peltigera aphthosa (L.) Willd.																	.6	-		
All other lichens													44.8	15.9			17.5	7.2		
Stratum total	.2												90.2				46.2			
Unidentified																				
Community total			1,051.3				2,043.5				6,250.1				97,625.7				187,087.8	

Table 7.--Aboveground ovendry biomass by species and stratum for the aspen-birch community type of northeastern Minnesota

(In Kg/ha)

	Little Sioux Fire											
	1 n = 2				3 n = 2				5 n = 2			
	Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Tree												
Abies balsamea (L.) Mill.												
Acer rubrum L.												
Betula papyrifera Marsh.												
Picea glauca (Moench) Voss.												
Picea mariana (Mill.) B.S.P.												
Pinus banksiana Lamb.												
Pinus resinosa Ait.												
Pinus strobus L.												
Populus grandidentata Michx.												
Populus tremuloides Michx.												
Thuja occidentalis L.												
Stratum total												
Sapling												
Abies balsamea (L.) Mill.												
Betula papyrifera Marsh.												
Fraxinus nigra Marsh.												
Picea glauca (Moench) Voss.												
Picea mariana (Mill.) B.S.P.												
Pinus banksiana Lamb.												
Pinus strobus L.												
Populus balsamifera L.												
Populus grandidentata Michx.												
Populus tremuloides Michx.												
Stratum total												

	Little Sioux Fire											
	1 n = 2				3 n = 2				5 n = 2			
	Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	S
Tree seedling												
Abies balsamea (L.) Mill.												
Acer rubrum L.			62.7	7.6	241.2	83.0	574.7	265.4	400.6	164.2	1,526.4	80
Betula papyrifera Marsh.			2.4	-	3.2	-	7.9	-	207.0	-	785.4	
Fraxinus nigra Marsh.												
Picea glauca (Moench) Voss.												
Picea mariana (Mill.) B.S.P.												
Pinus banksiana Lamb.			.2	.1	36.8	-	61.2	-	133.4	133.2	282.8	28
Pinus strobus L.												
Populus grandidentata Michx.			110.4	-	165.4	3.1	704.2	95.8	671.8	324.1	3,094.7	1,14
Populus tremuloides Michx.			843.6	692.2	543.8	519.4	1,075.2	966.3	1,112.4	570.1	7,360.2	4,77
Quercus rubra L.												
Sorbus americana Marsh.												
Stratum total			1,019.3		990.4		2,423.2		2,525.2		13,049.5	
Tall shrub												
Acer spicatum Lam.			23.1	-								
Alnus crispa (Ait.) Pursh.												
Alnus rugosa (DuRoi) Spreng.												
Amelanchier Medic. spp.					10.2	-	38.4	-				
Cornus rugosa Lam.												
Cornus stolonifera Michx.												
Corylus cornuta Marsh.			45.2	34.6	391.4	74.7	1,253.2	494.2	347.0	120.1	1,266.5	59
Lonicera canadensis Marsh.			19.1	-	20.7	20.2	44.4	43.4	69.6	64.6	169.1	16
Lonicera hirsuta Eat.												
Lonicera oblongifolia (Goldie) Hook.												
Lonicera villosa (Michx.) R.dS.												
Prunus pensylvanica L.F.			59.9	55.2	151.8	4.8	574.8	94.0	144.2	83.6	576.9	31
Prunus virginiana L.												

Isabella Plantations												BWCAW MATURE n = 10			
6-10 n = 1				11-15 n = 1				21-25 n = 1							
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
												362.6	153.0	2,802.9	1,182.0
				71.3		955.4		109.3		1,537.2					
48.6		1,397.5						356.7		8,928.7		607.6	169.1	15,449.0	4,166.9
2,288.6		21,140.7						16.8		93.0		369.8	169.1	3,426.9	1,555.8
												300.4	195.9	2,478.9	1,523.7
371.5		6,758.6		203.1		1,402.8		1,235.8		21,379.2		511.9	363.2	13,509.8	9,986.0
				1,740.7		17,913.1		1,319.2		15,259.1		74.7	49.9	1,180.0	793.7
												186.2	158.3	4,288.9	3,679.9
.8		23.5										18.8	13.2	1,282.2	910.3
72.8		1,161.8		539.4		11,327.7		461.5		13,367.6		1,423.2	294.6	74,407.0	16,318.2
												4.9	-	38.8	-
2,782.3		30,482.1		2,554.5		31,599.0		3,499.3		60,564.8		3,860.3		118,864.4	
												23.4	10.9	197.6	91.9
												114.9	20.2	4,200.9	746.5
												<.1	<.1	.3	.2
												22.3	10.5	147.3	68.8
												30.8	23.8	180.1	142.4
												1.8	1.0	14.1	8.0
												7.2	4.7	125.2	82.5
												.9	-	25.8	-
												1.6	.8	66.5	33.0
												145.4	37.2	3,750.4	1,008.2
												348.4		8,708.2	

Isabella Plantations												BWCAW MATURE n = 10			
6-10 n = 1				11-15 n = 1				21-25 n = 1							
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
												16.8	9.3	37.3	20.9
				99.6		845.8						.1	.1	1.4	1.1
												.9	.3	22.3	8.6
												.2	-	1.0	-
												8.4	7.4	16.9	15.3
												3.6	2.7	6.5	5.0
												.7	-	5.2	-
60.9		460.5		65.3		440.0		<0.1		0.6		22.2	10.4	141.5	74.8
												.1	-	.4	-
												.5	.3	2.6	1.4
60.9		460.5		164.9		1,285.8		.1		.6		53.5		235.1	
								48.6		412.4		38.1	16.1	294.2	131.8
44.2		434.5										88.0	30.8	767.7	296.6
												6.7	-	65.1	-
52.0		475.4		.8		3.6		78.1		1,093.7		22.9	8.3	233.7	83.3
1.8		6.4		148.9		803.5		8.0		34.6		24.7	9.7	154.9	67.7
												1.1	.8	5.9	4.2
234.2		2,075.4		146.5		1,299.4		343.2		2,821.0		195.5	42.8	1,190.7	271.2
								6.0		41.3		1.3	.5	5.1	2.2
												.2	.2	.1	.1
<.1		.1													
5.2		24.4										<.1	-	.1	-
<.1		.4						19.4		185.8		11.9	4.4	86.4	32.0
9.0		46.6										8.0	6.1	120.1	94.6

(Table 7 continued on next page)

(Table 7.--continued)

	Little Sioux Fire											
	1 n = 2				3 n = 2				5 n = 2			
	Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Salix bebbiana Sarg.												
Salix L. spp.												
Taxus canadensis Marsh.												
Viburnum rafinesquianum Schult.												
Stratum Total			147.3				574.1		1,910.8		560.8	
Low Shrub												
Arctostaphylos Uva-ursi (L.) Spreng.												
Chimaphila umbellata (L.) Bart.												
Comptonia peregrina B.&B. Small. Rydb.			.1	0			37.0	-			149.6	149.2
Diervilla Lonicera Mill.			.4	0			.2	-			21.1	-
Gaultheria procumbens L.			.3	-								
Ribes triste Pall.												
Ribes L. spp.												
Rosa blanda Ait.												
Rosa acicularis Lindl.												
Rubus parviflorus Nutt.												
Rubus pubescens Raf.			.2	-			9.4	-			<.1	-
Rubus strigosus Michx.			25.8	22.9			182.0	167.4			191.5	124.9
Vaccinium angustifolium Ait.			7.2	-			25.4	23.8			25.7	24.2
Vaccinium myrtilloides Michx.			.2	-			8.0	-			10.8	-
Stratum Total			34.2				262.0				398.8	

	Little Sioux Fire											
	1 n = 2				3 n = 2				5 n = 2			
	Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Herb												
Actaea rubra (Ait.) Willd.												
Anaphalis margaritacea (L.) C.B. Clarke												
Anemone quinquefolia L.												
Antennaria spp. Gaertn.												
Apocynum androsaemifolium L.												
Aralia hispida Vent.	1.8	1.6			52.8	2.8			20.8	-		
Aralia nudicaulis L.	7.8	.8			37.4	2.1			40.6	31.3		
Asarum canadense L.												
Aster ciliolatus Lindl.												
Aster macrophyllus L.	235.3	53.8			139.4	29.6			71.7	.9		
Carex L. spp.	13.1	1.2			71.4	31.1			1.6	-		
Clintonia borealis (Ait.) Raf.	4.4	2.0			55.2	32.4			41.8	6.0		
Coptis groenlandica (Oeder) Fern.	.1	-										
Cornus canadensis L.	30.0	3.6			67.7	11.6			104.2	41.2		
Corydalis sempervirens (L.) Pers.	9.5	1.6										
Epilobium angustifolium L.					21.7	-			18.6	-		
Fragaria vesca L.					.1	-						
Fragaria virginiana Duchesne.												
Galium triflorum Michx.	.2	-										
Geranium bicknellii Britt.	83.4	64.8			.1	-			.7	-		
Goodyera repens (L.) R. Br.												
Grasses	.1	-			40.5	35.5			4.9	.4		
Hepatica americana (D.C.) Ker.												
Hieracium scabrum Michx.												

Isabella Plantations								BWCAW			
6-10 n = 1				11-15 n = 1				21-25 n = 1				MATURE n = 10			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
												1.2	0.8	5.4	4.0
0.1		0.2		100.2		1,127.6						.2	.1	.2	.1
												.3	-	.4	-
												3.6	2.2	22.0	14.3
346.6		3,063.4		396.4		3,234.1		503.3		4,588.8		403.8		2,952.0	
														1.6	-
		10.3												.2	.1
						21.0								4.0	-
		36.2				53.1								107.4	34.4
														<.1	-
														.4	-
		.7				27.6									
		16.4				93.9				37.4				6.4	2.0
						140.7									
		.1								<.1				5.8	2.7
		7.4				10.3								16.8	13.7
		2.7				4.6				5.2				10.2	6.6
										12.6				14.4	9.8
		73.8				351.2				55.3				167.3	

Isabella Plantations								BWCAW			
6-10 n = 1				11-15 n = 1				21-25 n = 1				MATURE n = 10			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
												0.2	-		
<0.1												.3	0.2		
.5								<.1				1.0	1.0		
												.6	.5		
												2.3	1.3		
.3								33.3				34.0	8.5		
												2.4	-		
												1.3	.9		
83.8				151.4				83.7				188.5	35.8		
<.1												8.3	2.9		
								25.6				9.7	3.2		
												4.0	3.0		
				.7				.9				7.3	2.3		
				.2								2.4	1.6		
1.9												10.9	2.6		
3.0				4.0								.1	-		
												1.4	1.1		
												.1	-		
105.7				149.9				68.9				81.5	18.7		
												1.1	.9		
												.7	-		

(Table 7 continued on next page)

(Table 7.--continued)

	Little Sioux Fire											
	1 n = 2				3 n = 2				5 n = 2			
	Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	
Lactuca canadensis L.												
Lactuca L. spp.												
Lathyrus ochroleucus Hook.												
Lathyrus venosus Muhl.	.1	-										
Lathyrus L. spp.												
Linnaea borealis L.	1.1	1.0			0.4	0.2			0.6	-		
Lysmachia ciliata L.												
Maianthemum canadense Desf.	1.6	.5			5.2	.4			13.6	4.6		
Melampyrum lineare Desr.												
Mitella nuda L.												
Moneses uniflora (L.) Gray												
Petasites palmatus (Ait.) Gray												
Petasites vitifolius Rydb.												
Polygonatum pubescens (Willd.) Pursh												
Polygonum cilinode Michx.	104.0	53.4			174.7	2.7			4.5	.3		
Prunella vulgaris L.												
Pyrola elliptica Nutt.												
Pyrola rotundifolia L.												
Pyrola secunda L.	<.1	-										
Pyrola virens Schweigg.												
Pyrola L. spp.									1.4	.2		
Sanicula marilandica L.												
Streptopus roseus Michx.	.3	-			1.1	-			.9	-		
Taraxacum Zinn. spp.												
Trientalis borealis Raf.	.1	-			.6	.1			.1	-		
Trifolium repens L.												

	LITTLE SIOUX FIRE											
	1 n = 2				3 n = 2				5 n = 2			
	Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Uvularia sessilifolia L.												
Vicia americana Muhl.									1.1	-		
Viola L. spp.	0.3	0.2			0.2	-						
Stratum total	493.3				668.5				327.1			
Fern and fern allies												
Athyrium filix-femina (L.) Roth.												
Dryopteris spinulosa (O.F. Muell.) Watt												
Equisetum L. spp.												
Lycopodium annotinum L.												
Lycopodium clavatum L.												
Lycopodium complanatum L.									1.2	.6		
Lycopodium obscurum L.	3.2	3.1			12.2	-			19.4	-		
Osmunda claytoniana L.												
Polypodium virginianum L.												
Pteridium aquilinum (L.) Kuhn.												
Stratum total	3.2				12.2				20.6			
Moss												
Calliergonella schreberi (Willd., BR. & Sch.) Grout												
Dicranum Hedw. spp.												

	LITTLE SIOUX FIRE											
	1 n = 2				3 n = 2				5 n = 2			
	Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Polytrichum Hedw. spp.	0.1	-			0.1	-			12.6	2.2		
All other mosses												
Stratum total	.1				.1				12.6			
Lichen												
Cladonia mitis Sandst.												
Cladonia rangiferina (L.) Web.												
All other lichens												
Stratum total												
Unidentified plants	.1	-										
Community total			1,697.5				5,276.8				15,821.1	

Isabella Plantations

6-10 n = 1				11-15 n = 1				21-25 n = 1				BW AW MATURE	
Foliage		Total		Foliage		Total		Foliage		Total		Foliage	Total
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$ SE	$\bar{X}$
												0.2 -	
												.1 -	
13.2				25.5				1.4				3.6 2.2	
				32.8								1.5 1.4	
5.0													
				2.3								4.5 2.6	
												.9 .7	
				1.6				5.3				5.9 1.2	
												.7 .3	
												2.1 1.6	
												.1 -	
												.1 .7	
												.1 -	
												1.0 -	
												.1 -	
												.2 .1	
												.2 -	
												.3 .2	
												<.1 -	
												1.8 -	
								.2				1.4 .6	
												.2 .2	
												.5 .2	
												.1 -	

Isabella Plantations

6-10 n = 1				11-15 n = 1				21-25 n = 1				BW AW MATURE n = 10	
Foliage		Total		Foliage		Total		Foliage		Total		Foliage	Total
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$ SE	$\bar{X}$
												0.1 -	
												.3 .2	
213.5				368.4				219.6				385.5	
												2.0 1.9	
												.4 -	
												.2 .1	
												.2	
				.3								.9 .6	
												2.7 2.0	
												3.3 -	
												1.9 -	
				376.3				138.5				93.7 19.3	
				376.6				138.5				105.3	
												43.8 19.9	
												2.9 1.6	

ISABELLA PLANTATIONS

6-10 n = 1				11-15 n = 1				21-25 n = 1				BWCAW MATURE n = 10	
Foliage		Total		Foliage		Total		Foliage		Total		Foliage	Total
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$ SE	$\bar{X}$
												21.8 13.1	
												298.3 52.7	
												366.8	
												4.8	
												11.6 8.4	
												27.5 11.1	
												43.9	
												1.2	
		34,293.3				37,215.1				65,567.6			131,829.6

Table 8.--Aboveground ovendry biomass by species and stratum for the fir-birch community type of northeastern Minnesota

(In Kg/ha)

	Isabella Plantations								Cherokee-Frost Lake				BWCAW			
	1-5 n = 2				11-15 n = 1				33 n = 7				MATURE n = 22			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Tree																
Abies balsamea (L.) Mill.	2.3	-	21.5	-	130.0		1,061.6		256.9	139.5	2,168.6	1,194.5	2,385.3	427.0	18,805.5	3,362.4
Acer rubrum L.													15.2	9.2	545.4	337.1
Betula papyrifera Marsh.					1,117.2		27,228.5		1,107.9	157.5	37,923.8	6,858.2	1,479.9	333.1	34,537.8	7,737.6
Picea glauca (Moench) Voss.	45.1	-	350.9	-					218.0	126.2	1,554.6	972.2	1,004.4	253.6	9,640.4	2,685.5
Picea mariana (Mill.) B.S.P.					2,074.3		17,606.6		168.4	130.6	1,243.6	981.7	1,287.3	397.2	11,637.8	3,546.5
Pinus banksiana Lamb.	2.7	-	18.5	-	1,954.2		39,550.8		338.1	135.9	6,233.5	2,566.2	224.2	100.9	6,098.3	2,769.8
Pinus resinosa Ait.	10.6	9.4	83.2	74.0									24.6	18.6	346.1	256.1
Pinus strobus L.									3.0	2.0	51.0	33.2	317.3	163.3	6,649.0	3,443.6
Populus tremuloides Michx.	266.8	116.0	4,917.5	2,571.7	60.2		2,124.2		485.7	124.4	16,943.6	5,172.7	650.8	181.8	34,718.8	9,273.7
Sorbus americana Marsh.													1.3	1.1	14.9	12.5
Thuja occidentalis L.									17.1	-	109.7	-	1,388.0	477.6	12,828.3	4,665.6
Stratum total	327.5		5,391.6		5,335.9		87,571.7		2,595.1		66,228.4		8,778.3		135,822.3	
Sapling																
Abies balsamea (L.) Mill.									46.9	31.9	384.0	257.5	826.1	140.1	6,996.7	1,187.8
Acer rubrum L.													2.4	1.4	37.5	21.8
Betula papyrifera Marsh.									294.9	136.1	10,846.1	5,037.0	82.3	22.1	2,950.0	805.8
Picea glauca (Moench) Voss.									94.8	60.6	614.0	403.5	41.2	32.4	261.2	207.3
Picea mariana (Mill.) B.S.P.									204.6	151.2	1,192.3	907.1	151.4	58.8	892.9	344.8
Pinus banksiana Lamb.									19.9	13.4	169.9	116.1	.6	.5	3.2	2.4
Pinus strobus L.										.			6.4	6.0	113.9	106.2
Populus grandidentata Michx.													.2	-	6.9	-
Populus tremuloides Michx.									471.6	253.3	12,432.8	6,763.4	23.3	13.1	588.5	336.4
Sorbus americana Marsh.									11.9	9.3	175.3	145.1	4.3	2.3	43.5	23.1
Thuja occidentalis L.									4.5	3.4	14.8	11.2	329.5	157.7	1,609.3	748.8
Stratum total									1,149.1		25,829.2		1,467.7		13,503.6	

(Table 8 continued on next page)

(Table 8.--continued)

	Isabella Plantations								Cherokee-Frost Lake				BWCAW			
	1-5 n = 2				11-15 n = 1				33 n = 7				MATURE n = 22			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Tree seedling																
Abies balsamea (L.) Mill.									87.1	24.1	206.9	59.3	67.9	9.3	146.5	22.8
Acer rubrum L.									.6	-	18.1	-	2.3	1.4	44.9	29.1
Betula papyrifera Marsh.					0.5		1.5		7.3	2.3	185.2	64.1	1.2	.3	23.6	5.8
Fraxinus nigra Marsh.													<.1	-	.2	-
Picea glauca (Moench) Voss.									23.1	11.2	46.7	23.6	3.1	1.0	5.0	1.6
Picea mariana (Mill.) B.S.P.									33.2	13.1	68.0	27.6	8.3	4.1	15.0	7.6
Pinus banksiana Lamb.									.1	-	.5	-				
Pinus resinosa Ait.													.1	-	.4	-
Pinus strobus L.													1.0	.4	5.9	2.4
Populus tremuloides Michx.	154.5	-	897.6	-					4.0	1.4	22.4	8.4	5.9	1.6	33.6	9.4
Quercus rubra L.													.2	-	1.0	-
Sorbus americana Marsh.					3.0		28.6		1.7	.7	8.9	3.7	4.8	1.0	25.5	5.1
Thuja occidentalis L.									104.2	80.8	218.8	176.6	22.9	8.0	38.4	14.0
Stratum total	154.5		897.6		3.0		28.6		261.3		775.5		117.8		340.0	
Tall shrub																
Acer spicatum Lam.	.1	-	3.0	-	41.0		471.2		65.3	33.5	550.0	374.4	69.9	22.2	611.6	220.2
Alnus crispa (Ait.) Pursh.					107.5		1,040.4		17.0	13.6	155.4	114.1	1.1	.5	6.8	3.2
Alnus rugosa (DuRoi) Spreng.									.5	-	5.0	-	6.9	-	66.5	-
Amelanchier Medic. spp.					.3		1.6		.3	.3	3.4	3.3	.1	.1	1.5	1.1
Cornus rugosa Lam.									.6	-	1.3	-	1.9	1.4	10.1	7.4
Corylus cornuta Marsh.	.5	-	5.3	-	246.4		2,030.0		63.0	14.3	383.6	89.0	26.4	10.6	157.2	68.7
Lonicera canadensis Marsh.									.9	.5	2.8	1.7	1.7	.3	5.5	1.2
Lonicera hirsuta Eat.					1.7		4.2						.1	.1	.2	.2
Lonicera oblongifolia (Goldie) Hook.					.2		.7									
Lonicera villosa (Michx.) R.dS.									.1	-	.1	-	<.1	-	<.1	-
Prunus pensylvanica L.f.					6.8		67.2		30.1	12.3	338.0	137.4	<.1	<.1	<.1	<.1
Prunus virginiana L.					4.9		21.3		.1	-	.6	-	.1	-	.7	-
Salix bebbiana Sarg.									104.6	8.1	117.5	94.5	4.4	4.4	141.6	141.6
Salix L. spp.									22.4	-	728.4	-	.2	-	.7	-
Sambucus canadensis L.									<.1	-	<.1	-				
Sambucus L. spp.													3.2	-	40.4	-
Taxus canadensis Marsh.													5.2	5.1	11.8	11.7
Viburnum rafinesquianum Schult.													.1	-	.2	-
Stratum total	.6		8.3		408.8		3,636.6		305.0		2,286.2		121.4		1,054.9	

(Table 8 continued on next page)

(Table 8.--continued)

	Isabella Plantations								Cherokee-Frost Lake				BWCAW			
	1-5 n = 2				11-15 n = 1				33 n = 7				MATURE n = 22			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Low shrub																
Chimaphila umbellata (L.) Bart.							2.9				1.6	-			1.4	0.7
Diervilla Lonicera Mill.			50.4	21.1			40.2				11.7	5.3			9.2	2.3
Gaultheria hispidula (L.) Muhl.															.2	-
Gaultheria procumbens L.							2.9									
Ribes L. spp.											1.9	-			.2	-
Rosa acicularis Lindl.			3.3	3.1			32.1				4.8	2.0			1.7	.7
Rubus parviflorus Nutt.											2.8	-			4.3	2.3
Rubus pubescens Raf.			.3	-			4.2				14.1	9.1			3.2	1.0
Rubus strigosus Michx.			183.6	14.6			1.9				4.4	1.6			19.4	14.7
Vaccinium angustifolium Ait.							1.6				.3	-			2.1	.7
Vaccinium myrtilloides Michx.			.9	-			24.3				3.4	-			4.5	1.4
Stratum total			238.5				110.1				45.0				46.2	
Herb																
Actaea rubra (Ait.) Willd.									0.3	-			0.1	0.1		
Anaphalis margaritacea (L.) C.B. Clarke									1.1	0.5						
Anemone quinquefolia L.					<0.1				.1	-			.1	<.1		
Apocynum androsaemifolium L.									3.1	2.3			.4	.3		
Aralia nudicaulis L.					10.2				41.6	7.8			14.2	3.2		
Aster ciliolatus Lindl.									.6	.3			.1	-		
Aster macrophyllus L.	43.5	.2			12.1				159.4	31.3			51.5	9.3		
Aster L. spp.									.3	-						
Carex L. spp.									13.8	6.3			2.5	1.0		
Circaea alpina L.	<.1	-											.2	-		
Clintonia borealis (Ait.) Raf.	1.0	-			6.6				7.2	1.8			10.7	2.3		
Coptis groenlandica (Oeder) Fern.									.2	-			2.6	1.4		

(Table 8 continued on next page)

(Table 8.--continued)

	Isabella Plantations								Cherokee-Frost Lake				BWCAW			
	1-5 n = 2				11-15 n = 1				33 n = 7				MATURE n = 22			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Cornus canadensis L.	3.0	-			26.6				43.6	10.2			23.4	4.9		
Cynoglossum boreale Fern.													.1	.1		
Epilobium angustifolium L.									8.4	3.1			.1	-		
Epigaea repens L.													.6	-		
Fragaria vesca L.	35.6	33.0							.1	-			3.7	1.1		
Fragaria virginiana Duchesne.					.4											
Galium boreale L.													<.1	-		
Galium triflorum Michx.	<.1	-							1.4	.8			.3	.2		
Goodyera repens (L.) R. Br.									.2	-			.3	.1		
Goodyera tesselata Lodd.									2.4	1.5			<.1	-		
Grasses	254.3	31.0			46.7				28.7	7.7			15.8	3.7		
Habenaria orbiculata (Pursh) Torr.													.1	-		
Hieracium scabrum Michx.													.1	-		
Impatiens capensis Meerb.													.8	-		
Lactuca L. spp.	<.1	-														
Lathyrus ochroleucus Hook.	9.8	7.1											.3	.2		
Linnaea borealis L.					4.1				22.6	8.3			15.8	3.2		
Maianthemum canadense Desf.					.9				6.6	1.4			6.0	1.1		
Melampyrum lineare Desr.									.3	-			.1	.1		
Mitella nuda L.													1.4	.5		
Moneses uniflora (L.) Gray													.1	.1		
Petasites palmatus (Ait.) Gray									.5	.3						
Petasites vitifolius Rydb.													.4	.3		
Polygala paucifolia Willd.					.1											
Polygonum cilinode Michx.													.2	-		
Pyrola asarifolia Michx.													<.1	-		
Pyrola elliptica Nutt.									.1	-			.1	<.1		
Pyrola rotundifolia L.									.1	-			.1	.1		
Pyrola secunda L.									.1	-			.7	.2		
Pyrola virens Schweigg.									.1	-			.2	.1		
Streptopus roseus Michx.									2.2	.9			.1	.3		
Taraxacum spp.									.1	-						
Thalictrum dioicum L.													.1	-		
Trientalis borealis Raf.					<.1				7.3	6.0			.3	.1		
Uvularia sessilifolia L.													<.1	-		
Vicia americana Muhl.	.1												.2	.1		
Viola L. spp.					.4				1.4	.4			1.0	.2		
Waldsteinia fragarioides (Michx.) Tratt.									.1	-			<.1	-		
Stratum total	347.3				108.1				353.7				154.9			

(Table 8 continued on next page)

(Table 8.--continued)

	Isabella Plantations								Cherokee-Frost Lake				BWCAW			
	1-5 n = 2				11-15 n = 1				33 n = 7				MATURE n = 22			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Fern and fern allies																
Athyrium filix-femina (L.) Roth.													0.1	-		
Botrychium virginianum (L.) Sw.													<.1	-		
Dryopteris spinulosa (O.F. Muell.) Watt									2.2	2.0			.2	0.2		
Equisetum L. spp.									.3	.2			.1	-		
Gymnocarpium Dryopteris (L.) Newm.									3.0	-			.1	.1		
Lycopodium annotinum L.													3.8	1.9		
Lycopodium clavatum L.					<.1				3.9	1.4			4.0	1.1		
Lycopodium complanatum L.					<.1								.2	.1		
Lycopodium lucidulum Michx.													.1	-		
Lycopodium obscurum L.					<.1				3.4	1.4			4.0	2.0		
Pteridium aquilinum (L.) Kuhn.	114.1	39.1			14.3								2.6	1.1		
Stratum total	114.1				14.4				12.8				15.3			
Moss																
Calliergonella schreberi (Willd., BR. & Sch.) Grout									143.0	25.2			555.7	99.9		
Dicranum Hedw. spp.									41.1	12.0			43.1	11.4		
Hylocomium splendens (Hedw.) B.S.G.									1.0	.7			16.9	8.7		
Hypnum crista-castrensis Hedw.									.6	.4			14.6	4.9		
Polytrichum Hedw. spp.									44.2	20.6			13.2	7.0		
Sphagnum L. spp.													6.4	-		
All other mosses									165.5	42.3			469.5	57.2		
Stratum total									395.4				1,119.4			
Lichen																
Cladonia rangiferina (L.) Web.									18.9	10.0			3.4	3.0		
Cladonia sylvatica (L.) Hoffm.									1.5	1.0			7.9	6.1		
All other lichens									25.9	11.0			14.2	4.9		
Stratum total									46.3				25.5			
Community total			6,997.4				91,469.5				95,972.5				152,082.1	

Table 9.--Aboveground ovendry biomass by species and stratum for the maple-aspen-birch community type of northeastern Minnesota

(In Kg/ha)

	BWCAW MATURE (n = 20)			
	Foliage		Total	
Stratum/Species	$\bar{X}$	SE	$\bar{X}$	SE
Tree				
Abies balsamea (L.) Mill.	278.8	89.6	2,165.4	694.1
Acer rubrum L.	471.5	90.0	18,646.1	3,714.4
Betula papyrifera Marsh.	906.0	160.2	22,950.0	3,986.2
Fraxinus nigra Marsh.	2.3	-	53.0	-
Picea glauca (Moench) Voss.	200.2	105.2	1,833.1	972.2
Picea mariana (Mill.) B.S.P.	103.1	36.7	948.2	344.5
Pinus banksiana Lamb.	179.7	75.1	4,336.7	1,717.4
Pinus resinosa Ait.	890.7	449.1	12,677.8	6,378.2
Pinus strobus L.	949.2	511.1	21,823.7	11,554.8
Populus grandidentata Michx.	94.9	38.9	6,610.4	2,811.7
Populus tremuloides Michx.	1,057.7	151.0	56,737.4	8,429.8
Quercus rubra L.	77.6	44.2	1,560.8	921.2
Sorbus americana Marsh.	2.3	-	26.4	-
Stratum total	5,214.0		15,0369.0	
Sapling				
Abies balsamea (L.) Mill.	136.2	63.3	1,151.5	533.6
Acer rubrum L.	247.4	58.1	4,568.0	1,097.3
Betula papyrifera Marsh.	152.6	25.6	5,495.4	908.3
Fraxinus nigra Marsh.	.9	.7	11.4	8.1
Picea glauca (Moench) Voss.	21.6	13.6	137.8	87.0
Picea mariana (Mill.) B.S.P.	22.3	15.3	136.5	99.2
Pinus resinosa Ait.	1.2	.8	11.8	7.5
Pinus strobus L.	.6	.5	11.6	8.4
Populus grandidentata Michx.	5.7	2.1	235.8	84.4
Populus tremuloides Michx.	57.8	15.0	1,499.7	390.2
Quercus rubra L.	9.7	5.8	96.7	57.9
Sorbus americana Marsh.	5.4	2.6	56.3	27.4
Stratum total	661.4		13,412.5	
Tree seedling				
Abies balsamea (L.) Mill.	30.6	12.2	69.5	28.5
Acer rubrum L.	12.0	2.0	169.4	30.2
Betula papyrifera Marsh.	.9	.2	20.4	5.3
Fraxinus nigra Marsh.	1.0	.6	5.5	3.6
Picea glauca (Moench) Voss.	5.4	2.9	10.1	5.7
Picea mariana (Mill.) B.S.P.	.6	.4	1.0	.6
Pinus Resinosa Ait.	.1	.1	.5	.3
Pinus strobus L.	2.1	.8	13.1	4.5
Populus grandidentata Michx.	.2	.2	1.3	1.0
Populus tremuloides Michx.	8.7	1.6	51.3	10.9
Quercus rubra L.	7.9	3.4	37.7	17.2
Sorbus americana Marsh.	.8	.4	4.0	1.8
Thuja occidentalis L.	.2	-	.4	-
Stratum total	70.5		384.2	
Tall shrub				
Acer spicatum Lam.	49.9	15.6	397.9	139.5
Alnus crispa (Ait.) Pursh.	38.0	19.4	286.2	147.3
Amelanchier Medic. spp.	11.4	4.4	112.7	41.5
Cornus rugosa Lam.	9.3	5.8	47.3	36.3
Lonicera canadensis Marsh.	1.1	.5	5.6	3.4
Lonicera villosa (Michx.) R.dS.	<.1	-	<.1	-
Prunus pensylvanica L.F.	<.1	-	<.1	-
Prunus virginiana L.	.1	.1	.5	.5
Salix bebbiana Sarg.	13.7	13.2	532.1	530.0
Salix L. spp.	<.1	-	<.1	-
Viburnum reginesquianum Schult.	.8	.6	2.8	2.1
Stratum total	331.0		2,644.7	

(Table 9 continued on next page)

(Table 9.--continued)

	BWCAW MATURE (n = 20)			
	Foliage		Total	
Stratum/Species	$\bar{X}$	SE	$\bar{X}$	SE
Low shrub				
Arctostaphylos Uva-ursi (L.) Spreng.			0.4	-
Chimaphila umbellata (L.) Bart.			.2	0.1
Comptonia peregrina B.&B. Small. Rydb.			1.4	1.0
Diervilla Lonicera Mill.			11.4	2.2
Gaultheria procumbens L.			.8	.4
Rosa acicularis Lindl.			.1	-
Rubus pubescens Raf.			1.4	.8
Rubus strigosus Michx.			1.2	.4
Vaccinium angustifolium Ait.			9.0	2.9
Vaccinium myrtilloides Michx.			8.3	5.9
Stratum total			34.2	
Herb				
Anaphalis margaritacea (L.) C.B. Clarke	0.1	-		
Anemone quinquefolia L.	.1	0.1		
Apocynum androsaemifolium L.	1.0	.8		
Aralia nudicaulis L.	27.4	4.6		
Aster ciliolatus Lindl.	.2	-		
Aster macrophyllus L.	132.7	20.0		
Carex L. spp.	10.7	5.5		
Clintonia borealis (Ait.) Raf.	11.6	2.9		
Coptis groenlandica (Oeder) Fern.	1.7	.8		
Cornus canadensis L.	8.9	3.6		
Epilobium angustifolium L.	.2	-		
Fragaria vesca L.	2.3	1.2		
Galium triflorum Michx.	.1	<.1		
Geranium bicknellii Britt.	.2	.1		
Goodyera repens (L.) R. Br.	.2	.1		
Goodyera tesselata Lodd.	.1	.1		
Grasses	26.9	5.3		
Impatiens capensis Meerb.	.3	.2		
Lathyrus ochroleucus Hook.	.7	.3		
Lathyrus venosus Muhl.	.1	-		
Linnaea borealis L.	4.1	1.6		
Maianthemum canadense Desf.	8.6	1.2		
Melampyrum lineare Desr.	.5	.3		
Mitella nuda L.	.1	-		
Monotropa uniflora L.	<.1	-		
Petasites vitifolius Rydb.	.3	-		
Pyrola rotundifolia L.	<.1	-		
Pyrola secunda L.	.1	.1		
Streptopus roseus Michx.	2.0	.5		
Trientalis borealis Raf.	.6	.1		
Uvularia sessilifolia L.	.2	.1		
Viola L. spp.	.5	.1		
Stratum total	242.6			
Fern and fern allies				
Dryopteris Phegopteris L.	.5	-		
Dryopteris spinulosa (O.F. Muell.) Watt	1.2	1.1		
Gymnocarpium Dryopteris (L.) Newm.	.3	-		
Lycopodium annotinum L.	3.1	1.4		
Lycopodium clavatum L.	4.2	1.3		
Lycopodium complanatum L.	1.9	1.9		
Lycopodium obscurum L.	9.7	2.2		
Osmunda claytoniana L.	2.0	1.8		
Polypodium virginianum L.	.3	-		
Pteridium aquilinum (L.) Kuhn.	51.7	13.4		
Stratum total	74.9			
Moss				
Calliergonella schreberi (Willd., BR. & Sch.) Grout	84.3	21.8		
Dicranum Hedw. spp.	27.0	14.1		
Hypnum crista-castrensis Hedw.	.7	-		
Polytrichum Hedw. spp.	11.4	8.1		
All other mosses	304.4	48.4		
Stratum total	427.8			
Lichen				
Cladonia mitis Sandst.	.5	-		
Cladonia rangiferina (L.) Web.	7.4	-		
Cladonia sylvatica (L.) Hoffm.	.5	-		
Peltigera aphthosa (L.) Willd.	1.0	.7		
All other lichens	25.7	6.8		
Stratum total	35.1			
Community total			167,625.0	

Table 10.--Aboveground ovendry biomass by species and stratum for the maple-aspen-birch-fir community type of northeastern Minnesota

(In Kg/ha)

	BWCAW MATURE (n = 19)			
	Foliage		Total	
Stratum/Species	$\bar{X}$	SE	$\bar{X}$	SE
Tree				
Abies balsamea (L.) Mill.	1,402.8	376.3	11,054.6	2,987.3
Acer rubrum L.	425.8	103.5	16,099.1	3,957.9
Betula papyrifera Marsh.	1,084.3	303.8	24,927.6	7,103.9
Picea glauca (Moench) Voss.	289.8	75.7	2,637.4	714.8
Picea mariana (Mill.) B.S.P.	594.3	176.4	5,465.3	1,696.8
Pinus banksiana Lamb.	174.6	104.6	4,530.3	2,922.9
Pinus resinosa Ait.	320.6	224.6	5,051.0	3,515.2
Pinus strobus L.	982.7	423.6	23,497.5	10,136.9
Populus grandidentata Michx.	34.3	20.1	2,395.0	1,382.9
Populus tremuloides Michx.	1,296.6	301.2	73,057.3	18,290.4
Thuja occidentalis L.	90.4	88.8	1,408.9	1,392.4
Stratum total	6,696.2		170,124.0	
Sapling				
Abies balsamea (L.) Mill.	567.8	149.3	4,783.8	1,255.3
Acer rubrum L.	206.1	44.0	3,966.0	832.0
Betula papyrifera Marsh.	75.7	30.4	2,728.5	1,085.7
Picea glauca (Moench) Voss.	41.2	22.8	272.2	153.9
Picea mariana (Mill.) B.S.P.	129.5	53.3	756.2	296.7
Pinus banksiana Lamb.	.6	-	4.8	-
Pinus resinosa Ait.	.6	.4	6.1	4.2
Pinus strobus L.	.5	.4	9.4	7.8
Populus grandidentata Michx.	.4	.4	15.8	15.3
Populus tremuloides Michx.	37.2	12.7	1,014.5	352.2
Quercus rubra L.	.9	-	5.8	-
Sorbus americana Marsh.	24.9	18.8	246.5	184.2
Stratum total	1,085.4		13,809.6	
Tree seedling				
Abies balsamea (L.) Mill.	50.3	6.9	114.1	16.2
Acer rubrum L.	13.2	2.9	203.2	55.0
Betula papyrifera Marsh.	1.3	.2	27.6	5.6
Fraxinus nigra Marsh.	.1	-	.5	-
Picea glauca (Moench) Voss.	3.3	1.4	5.6	2.3
Picea mariana (Mill.) B.S.P.	4.6	2.6	7.9	4.4
Pinus resinosa Ait.	<.1	-	.2	-
Pinus strobus L.	1.5	.6	10.2	4.0
Populus grandidentata Michx.	.3	-	1.6	-
Populus tremuloides Michx.	10.2	2.1	57.0	12.4
Quercus rubra L.	3.4	3.1	18.5	16.8
Sorbus americana Marsh.	6.2	1.7	33.9	9.5
Thuja occidentalis L.	.1	-	.2	-
Tilia americana L.	<.1	-	.2	-
Stratum total	94.6		480.7	
Tall shrub				
Acer spicatum Lam.	96.8	29.5	867.6	313.3
Alnus crispa (Ait.) Pursh.	.6	.4	4.8	4.4
Alnus rugosa (DuRoi) Spreng.	<.1	-	<.1	-
Amelanchier Medic. spp.	16.4	14.9	127.2	110.2
Cornus rugosa Lam.	.6	.4	2.8	1.9
Corylus cornuta Marsh.	95.0	25.3	565.6	162.8
Lonicera canadensis Marsh.	.9	.3	3.5	1.3
Lonicera villosa (Michx.) R.dS.	<.1	<.1	.1	<.1
Prunus pensylvanica L.F.	13.4	11.7	75.9	65.1
Prunus virginiana L.	.1	.1	1.3	1.3
Salix bebbiana Sarg.	<.1	-	<.1	-
Salix L. spp.	<.1	-	<.1	-
Viburnum rafinesquianum Schult.	1.9	1.9	18.9	18.8
Stratum total	225.8		1,667.8	

(Table 10 continued on next page)

(Table 10.--continued)

Stratum/species	BWCAW MATURE (n = 19) Foliage $\bar{X}$	Foliage SE	Total $\bar{X}$	Total SE
Low shrub				
Chimaphila umbellata (L.) Bart.			0.6	0.3
Diervilla Lonicera Mill.			6.4	2.1
Gaultheria hispidula (L.) Muhl.			.7	.5
Gaultheria procumbens L.			3.5	1.8
Ledum groenlandicum Oeder.			<.1	-
Ribes L. spp.			.1	-
Rosa acicularis Lindl.			.8	.7
Rubus pubescens Raf.			3.3	1.8
Rubus strigosus Michx.			11.1	7.1
Vaccinium angustifolium Ait.			10.6	2.8
Vaccinium myrtilloides Michx.			4.9	2.2
Stratum total			42.1	
Herb				
Anemone quinquefolia L.	0.2	0.1		
Aralia nudicaulis L.	22.6	4.7		
Aster ciliolatus Lindl.	.1	-		
Aster macrophyllus L.	83.2	13.0		
Carex L. spp.	5.2	2.0		
Circaea alpina L.	.2	-		
Clintonia borealis (Ait.) Raf.	17.0	3.6		
Coptis groenlandica (Oeder) Fern.	2.6	.8		
Cornus canadensis L.	20.8	3.6		
Epilobium angustifolium L.	.1	-		
Epigaea repens L.	.1	-		
Fragaria vesca L.	1.1	.7		
Fragaria virginiana Duchesne.	.2	.2		
Galium triflorum Michx.	.5	.2		
Goodyera repens (L.) R. Br.	.1	.1		
Goodyera tesselata Lodd.	.1	.1		
Grasses	19.4	3.2		
Habenaria orbiculata (Pursh) Torr.	.2	-		
Habenaria spp.	<.1	-		
Lathyrus ochroleucus Hook.	.3	-		
Linnaea borealis L.	4.0	1.1		
Maianthemum canadense Desf.	12.4	1.2		
Melampyrum lineare Desr.	.6	.2		
Mitella nuda L.	.3	-		
Petasites vitifolius Rydb.	.4	.3		
Polygonum cilinode Michx.	.7	.4		
Pyrola secunda L.	.2	.1		
Pyrola virens Schweigg.	<.1	-		
Solidago L. spp.	.2	.1		
Streptopus roseus Michx.	2.2	.7		
Trientalis borealis Raf.	.8	.1		
Trifolium repens L.	<.1	-		
Viola L. spp.	.9	.2		
Waldsteinia fragarioides (Michx.) Tratt.	.1			
Stratum total	196.9			
Fern and fern allies				
Athyrium filix-femina (L.) Roth.	1.8	-		
Dryopteris spinulosa (O.F. Muell.) Watt	.4	.3		
Equisetum L. spp.	<.1	-		
Gymnocarpium Dryopteris (L.) Newm.	.2	.1		
Lycopodium annotinum L.	5.0	1.6		
Lycopodium clavatum L.	11.8	5.6		
Lycopodium complanatum L.	.6	.4		
Lycopodium lucidulum Michx.	2.9	-		
Lycopodium obscurum L.	12.4	2.6		
Osmunda claytoniana L.	1.9	-		
Polypodium virginianum L.	.3	.2		
Pteridium aquilinum (L.) Kuhn.	34.3	9.5		
Stratum total	71.7			
Moss				
Calliergonella schreberi (Willd., BR. & Sch.) Grout	207.6	50.8		
Dicranum Hedw. spp.	36.6	13.2		
Hylocomium splendens (Hedw.) B.S.G.	.2	-		
Hypnum crista-castrensis Hedw.	2.2	2.0		
Polytrichum Hedw. spp.	9.3	2.7		
Sphagnum L. spp.	2.0	-		
All other mosses	287.0	42.9		
Stratum total	544.9			
Lichen				
Cladonia rangiferina (L.) Web.	10.0	4.6		
Cladonia sylvatica (L.) Hoffm.	7.5	5.8		
Peltigera aphthosa (L.) Willd.	.7	-		
All other lichens	17.0	7.1		
Stratum total	35.2			
Community total			186,972.9	

Table 11.--Aboveground ovendry biomass by species and stratum for the jack pine-oak community type of northeastern Minnesota

(In Kg/ha)

	Little Sioux Fire											
	1 n = 1				3 n = 1				5 n = 1			
	Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Tree												
Abies balsamea (L.) Mill.												
Acer rubrum L.												
Betula papyrifera Marsh.												
Picea glauca (Moench) Voss.												
Picea mariana (Mill.) B.S.P.												
Pinus banksiana Lamb.												
Pinus resinosa Ait.												
Pinus strobus L.												
Populus grandidentata Michx.												
Populus tremuloides Michx.												
Quercus rubra L.												
Stratum total												
Sapling												
Abies balsamea (L.) Mill.												
Acer rubrum L.												
Betula papyrifera Marsh.												
Picea glauca (Moench) Voss.												
Picea mariana (Mill.) B.S.P.												
Pinus banksiana Lamb.												
Pinus resinosa Ait.												
Pinus strobus L.												
Populus grandidentata Michx.												
Populus tremuloides Michx.												
Quercus rubra L.												
Stratum total												

	Little Sioux Fire											
	1 n = 1				3 n = 1				5 n = 1			
	Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	S
Tree seedling												
Abies balsamea (L.) Mill.												
Acer rubrum L.			21.4		61.7		130.4		269.0		811.9	
Betula papyrifera Marsh.									421.0		1,883.8	
Picea mariana (Mill.) B.S.P.												
Pinus banksiana Lamb.			1.4		62.2		91.0		904.3		1,737.8	
Pinus strobus L.												
Populus balsamifera L.												
Populus grandidentata Michx.					5.2		11.2		25.8		70.3	
Populus tremuloides Michx.			1.5		84.0		250.2		51.8		215.0	
Quercus rubra L.							.3					
Sorbus americana Marsh.												
Stratum total			24.3		213.1		483.1		1,671.9		4,718.8	
Tall shrub												
Alnus crispa (Ait.) Pursh.												
Amelanchier Medic. spp.			13.7		20.6		43.6		302.8		1,134.0	
Cornus rugosa Lam.												
Corylus cornuta Marsh.			80.9									
Lonicera canadensis Marsh.									.3		.7	
Lonicera oblongifolia (Goldie) Hook.												
Lonicera villosa (Michx.) R.dS.												
Prunus pensylvanica L.F.			3.7		32.1		78.0		518.1		1,675.0	
Prunus virginiana L.												
Salix bebbiana Sarg.												
Salix L. spp.			90.2						147.3		605.0	
Spiraea L. spp.												
Stratum total			188.5		52.7		121.6		968.5		3,414.7	

Isabella Plantations												BWCAW			
11-15 n = 2				21-25 n = 2				26-30 n = 1				MATURE n = 6			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
50.2	-	384.9	-	1,281.0	-	9,900.6	-					10.8	-	87.3	-
												9.1	5.9	252.4	163.2
102.4	50.6	2,497.4	861.7	93.8	17.9	2,564.2	192.5					22.3	15.2	596.8	399.4
390.6	177.1	3,042.4	1,337.4	838.5	817.9	7,218.2	7,086.4								
459.8	-	3,942.2	-	548.9	94.6	4,357.7	1,443.3	47.7		237.6		583.4	447.4	5,015.9	3,858.0
2,432.1	1,601.1	24,572.3	15,871.4	2,151.3	-	30,665.5	-	2,645.7		37,501.9		5,230.2	783.3	95,630.2	13,837.6
507.8	-	4,886.9	-	2,256.0	763.8	24,902.4	8,571.5	3,556.6		40,409.6		423.0	399.0	6,363.2	6,021.9
				177.5	-	3,677.2	-					286.5	-	6,263.0	-
												18.8	15.8	1,283.7	1,114.1
				3.0	.6	73.9	29.1	577.5		25,657.7		30.1	11.1	1,292.2	559.1
												2.4	-	41.6	-
3,942.9		39,326.1		7,350.0		83,359.7		6,827.5		103,806.8		6,616.6		116,826.3	
												3.0	2.4	26.0	20.0
												18.0	15.7	353.0	319.0
												16.8	6.6	644.9	247.0
												12.7	12.2	83.1	80.6
												215.2	108.8	1,215.1	623.3
												573.5	341.7	5,730.6	3.326.6
												1.0	-	8.4	-
												2.4	1.3	41.9	22.3
												.3	-	11.3	-
												.8	.7	20.5	18.3
												10.9	4.6	98.4	42.0
												854.6		8,233.2	

Isabella Plantations												BWCAW			
11-15 n = 2				21-25 n = 2				26-30 n = 1				MATURE n = 6			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
												3.2	2.1	7.3	4.8
				<0.1	-	<0.1	-					1.9	.5	35.0	9.2
				2.6	2.5	57.8	57.6					.6	.4	15.5	10.6
												36.6	22.6	68.3	42.9
												.1	-	.6	-
												14.4	13.8	126.3	121.7
				<.1	-	.6	-								
												2.4	1.4	16.0	9.4
												7.2	3.6	38.6	19.8
												.1	-	.7	-
				2.7		58.5						66.5		308.3	
77.0	-	669.8	-	74.9	-	779.9	-	194.8		1,905.7		1.0	-	4.0	-
13.2	11.1	86.6	76.8	17.2	4.8	149.5	64.5	7.3		47.6		.6	.4	12.0	5.7
.2	-	.6	-					16.2		81.4					
76.0	69.1	693.2	631.2	124.6	-	1,233.7	-	178.1		1,494.9		18.2	7.0	95.7	43.4
4.0	3.0	30.6	22.3	3.3	2.7	22.1	17.5								
.3	-	1.1	-	<.1	-	<.1	-	2.6		10.6					
.6	-	4.0	-												
.8	.4	9.2	4.6	8.0	3.3	78.6	29.8								
				7.6	-	52.0	-					<.1	<.1	.1	.1
												4.8	4.7	73.8	73.7
				.5	-	1.6	-	8.6		37.5		5.1	-	40.5	-
												.3	-	.6	-
172.1		1,495.1		236.2		2,317.5		407.6		3,577.7		30.1		226.7	

(Table 11.--continued)

	Little Sioux Fire									
	1 n = 1				3 n = 1				5 n = 1	
	Foliage		Total		Foliage		Total		Foliage		Total
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$
Low shrub											
Chimaphila umbellata (L.) Bart.											
Comptonia peregrina B.&B. Small. Rydb.			40.5				799.4				1,377.0
Diervilla Lonicera Mill.			4.8				3.6				28.4
Gaultheria hispidula (L.) Muhl.											
Gaultheria procumbens L.			8.6				52.2				44.5
Ledum groenlandicum Oeder.											
Ribes L. spp.											
Rosa blanda Ait.											
Rosa acicularis Lindl.											
Rubus pubescens Raf.											
Rubus strigosus Michx.											
Vaccinium angustifolium Ait.			46.2				290.0				54.5
Vaccinium myrtilloides Michx.			15.0				8.7				156.6
Stratum total			115.1				1,153.9				1,661.0
Herb											
Anemone quinquefolia L.											
Apocynum androsaemifolium L.											
Aralia hispida Vent.	1.1				203.3				103.7		
Aralia nudicaulis L.	12.7				49.8				24.1		
Aster macrophyllus L.	333.3				194.1				135.0		
Carex L. spp.	14.4				24.7						
Clintonia borealis (Ait.) Raf.	1.6										
Coptis groenlandica (Oeder) Fern.											
Cornus canadensis L.	.1				6.8						
Corydalis sempervirens (L.) Pers.	1.9										

	Little Sioux Fire									
	1 n = 1				3 n = 1				5 n = 1	
	Foliage		Total		Foliage		Total		Foliage		Total
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$
Herb											
Epilobium angustifolium L.									7.7		
Epigaea repens L.											
Fragaria vesca L.											
Fragaria virginiana Duchesne.											
Geranium bicknellii	0.3										
Goodyera repens (L.) R. Br.											
Goodyera tesselata Lodd.											
Grasses					251.7				46.0		
Hieracium L. spp.											
Lathyrus ochroleucus Hook.											
Linnaea borealis L.											
Maianthemum canadense Desf.	3.9				14.0				13.6		
Melampyrum lineare Desr.					1.6						
Polygala paucifolia Willd.											
Polygonum cilinode Michx.	2.5				14.4				.7		
Pyrola rotundifolia L.											
Pyrola secunda L.											
Pyrola virens Schweigg.											
Solidago L. spp.											
Streptopus roseus Michx.											
Trientalis borealis Raf.											
Viola L. spp.	<.1										
Stratum total	371.9				760.4				330.8		
Fern and fern allies											
Lycopodium clavatum L.											
Lycopodium complanatum L.											
Lycopodium obscurum L.	.8										
Pteridium aquilinum (L.) Kuhn.	301.7				961.5				264.8		
Stratum total	302.5				961.5				264.8		

	Little Sioux Fire									
	1 n = 1				3 n = 1				5 n = 1	
	Foliage		Total		Foliage		Total		Foliage		Total
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$
Moss											
Calliergonella schreberi (Willd., BR. & Sch.) Grout											
Dicranum Hedw. spp.											
Polytrichum Hedw. spp.	0.1				5.2				33.2		
All other mosses											
Stratum total	.1				5.2				33.2		
Lichen											
Cladonia mitis Sandst.											
Cladonia rangiferina (L.) Web.											
All other lichens											
Stratum total											
Unidentified plants	.1				<.1						
Community total			1,002.5				3,485.8				10,423.3

Isabella Plantations												BWCAW			
11-15 n = 2				21-25 n = 2				26-30 n = 1				MATURE n = 6			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
		2.9	-			1.2	-							1.8	-
		61.1	-							21.6				2.7	1.8
		68.9	61.1			20.4	17.1			103.2				33.3	14.0
						3.7	-							3.1	1.6
		69.2	33.3			66.0	32.5			29.8				67.6	10.9
						17.6	-								
										1.1					
		9.2	-												
		60.5	43.4			20.0	6.6			29.4				1.8	1.2
		.3	.3			.5	.5			.8					
		19.4	1.6			4.1	.9			20.0					
		82.0	46.1			12.3	1.1			28.1				198.4	33.6
		89.1	32.3			74.9	57.0							14.5	8.4
		462.6				220.7				234.0				323.2	
7.5	-			<0.1	-			<0.1				<0.1	-		
												1.0	0.7		
1.8	1.7			.7	-			7.0				5.7	2.0		
76.0	38.0			17.9	14.1			106.3				68.5	26.1		
12.6	10.7			13.3	.1			1.4				1.3	.7		
				<.1	-			<.1							
33.8	17.0			14.9	12.2			.2				19.5	17.8		

Isabella Plantations												BWCAW			
11-15 n = 2				21-25 n = 2				26-30 n = 1				MATURE n = 6			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
												0.7	-		
				1.3	-							.3	-		
5.4	-			.4	-			9.8							
												.2	-		
												.2	-		
133.2	54.1			77.4	32.6			57.3				44.2	12.8		
								<.1							
2.5	-														
8.6	-			7.0	2.0			25.4				17.5	10.0		
8.4	1.5			1.5	1.2			9.1				12.9	2.1		
<.1	-											5.4	3.5		
<.1	0			<.1	-			<.1							
2.7	-			1.1	-			3.4							
2.7	-			.1	-			5.7							
1.1	-			1.1	-										
				<.1	-			<.1							
				<.1	-										
								<.1				.1	.1		
				.4	-			.2							
296.4				137.2				225.9				177.6			
<.1	-							2.7				.2	-		
				<.1	-			<.1							
<.1	-											.3	.2		
57.9	41.2			16.7	0			117.7				90.0	48.9		
58.0				16.8				120.5				90.5	18.4		

Isabella Plantations												BWCAW			
11-15 n = 2				21-25 n = 2				26-30 n = 1				MATURE n = 6			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
												672.1	232.3		
												254.9	47.8		
												74.2	49.5		
												137.2	65.5		
												1,138.4			
												282.2	209.7		
												247.8	100.6		
												116.2	70.7		
												646.2	78.1		
		41,638.2				86,110.4				107,964.9				127,970.4	

Table 12.--Aboveground ovendry biomass by species and stratum for the maple-oak community type of northeastern Minnesota

(In Kg/ha)

	BWCAW MATURE (n = 4)			
	Foliage		Total	
Stratum/species	$\bar{X}$	SE	$\bar{X}$	SE
Tree				
Abies balsamea (L.) Mill.	1,087.0	986.8	8,558.0	7,755.5
Acer rubrum L.	515.8	304.9	17,127.7	10,869.8
Betula papyrifera Marsh.	141.7	90.9	3,798.5	2,455.5
Picea glauca (Moench) Voss.	172.6	-	1,444.0	-
Picea mariana (Mill.) B.S.P.	66.9	-	546.3	-
Pinus banksiana Lamb.	89.8	-	1,944.1	-
Pinus resinosa Ait.	1,839.8	1,170.2	26,246.1	16,966.7
Pinus strobus L.	327.0	211.5	6,993.6	4,472.1
Populus grandidentata Michx.	89.6	65.9	5,396.8	3,832.4
Populus tremuloides Michx.	547.8	236.9	25,291.7	11,520.3
Quercus rubra L.	1,726.0	930.6	34,403.6	16,677.6
Stratum total	6,604.0		131,750.4	
Sapling				
Abies balsamea (L.) Mill.	410.9	265.3	3,436.3	2,218.7
Acer rubrum L.	373.4	29.0	6,715.1	524.9
Betula papyrifera Marsh.	32.4	18.7	1,142.9	639.5
Picea glauca (Moench) Voss.	33.1	-	226.8	-
Pinus banksiana Lamb.	14.8	-	162.9	-
Pinus resinosa Ait.	1.7	1.5	15.9	14.3
Pinus strobus L.	14.6	-	260.4	-
Populus grandidentata Michx.	2.7	-	125.2	-
Populus tremuloides Michx.	5.2	3.2	147.5	90.3
Quercus rubra L.	543.2	262.2	5,732.0	2,833.1
Sorbus americana Marsh.	2.9	-	27.5	-
Stratum total	1,434.9		17,992.5	
Tree seedling				
Abies balsamea (L.) Mill.	28.4	11.9	61.5	27.3
Acer rubrum L.	12.3	3.0	124.8	37.3
Betula papyrifera Marsh.	.6	.4	15.5	11.3
Picea glauca (Moench) Voss.	.8	.8	1.2	-
Pinus banksiana Lamb.	.1	-	.9	-
Pinus resinosa Ait.	2.5	-	21.2	-
Pinus strobus L.	4.2	2.9	30.4	22.5
Populus grandidentata Michx.	.5	-	2.8	-
Populus tremuloides Michx.	5.1	3.2	26.7	16.3
Quercus rubra L.	49.6	19.4	280.8	124.9
Sorbus americana Marsh.	3.5	2.1	21.6	13.8
Tilia americana L.	.2	-	.9	-
Stratum total	107.8		588.3	
Tall shrub				
Acer spicatum Lam.	.8	-	1.4	-
Amelanchier Medic. spp.	113.1	109.7	824.2	773.3
Cornus rugosa Lam.	.9	-	1.7	-
Corylus cornuta Marsh.	82.5	23.1	406.0	117.6
Lonicera canadensis Marsh.	1.3	-	4.2	-
Prunus pensylvanica L.F.	<.1	-	.1	-
Salix bebbiana Sarg.	.2	.2	.3	.3
Viburnum rafinesquianum Schult.	.3	-	.7	-
Stratum total	199.2		1,238.6	

(Table 12 continued on next page)

(Table 12.--continued)

Stratum/species	BWCAW MATURE (n = 4) Foliage $\bar{X}$	Foliage SE	Total $\bar{X}$	Total SE
Low shrub				
Comptonia peregrina B.&B. Small. Rydb.			4.0	2.9
Diervilla Lonicera Mill.			4.2	-
Gaultheria procumbens L.			24.3	9.7
Ribes triste Pall.			<.1	-
Rosa acicularis Lindl.			1.1	.6
Rubus pubescens Raf.			.4	-
Vaccinium angustifolium Ait.			66.1	42.7
Vaccinium myrtilloides Michx.			16.4	6.6
Stratum total			116.6	
Herb				
Anemone quinquefolia L.	<0.1	-		
Aralia nudicaulis L.	15.5	6.6		
Aster ciliolatus Lindl.	.3	-		
Aster macrophyllus L.	74.9	21.6		
Carex L. spp.	7.3	2.1		
Clintonia borealis (Ait.) Raf	5.4	1.3		
Coptis groenlandica (Oeder) Fern	.4	-		
Cornus canadensis L.	5.7	1.6		
Epigaea repens L.	4.8	-		
Fragaria vesca L.	.4	-		
Galium triflorum Michx.	<.1	-		
Goodyera repens (L.) R. Br.	.2	-		
Grasses	30.6	5.4		
Lathyrus ochroleucus Hook.	.4	-		
Maianthemum canadense Desf.	12.0	2.4		
Melampyrum lineare Desr.	5.5	2.6		
Mitella nuda L.	.2	-		
Monotropa uniflora L.	.1	.1		
Pyrola secunda L.	.1	.1		
Streptopus roseus Michx.	1.1	.6		
Trientalis borealis Raf.	.6	.3		
Uvularia sessilifolia L.	.1	.1		
Viola L. spp.	.2	-		
Stratum total	165.9			
Fern and fern allies				
Lycopodium annotinum L.	1.6	1.1		
Lycopodium clavatum L.	2.0	1.8		
Lycopodium obscurum L.	1.7	1.2		
Pteridium aquilinum (L.) Kuhn.	37.7	9.2		
Stratum total	43.0			
Moss				
Calliergonella schreberi (Willd., BR. & Sch.) Grout	31.8	23.4		
Dicranum Hedw. spp.	43.3	18.3		
Polytrichum Hedw. spp.	18.2	10.3		
All other mosses	194.6	50.5		
Stratum total	287.9			
Lichen				
Cladonia rangiferina (L.) Web.	5.3	3.7		
All other lichens	17.2	3.9		
Stratum total	22.5			
Community total			152,205.7	

Table 13.--Aboveground ovendry biomass by species and stratum for the red pine community type of northeastern Minnesota

(In Kg/ha)

	BWCAW MATURE (n = 6)			
	Foliage		Total	
Stratum/species	$\bar{X}$	SE	$\bar{X}$	SE
Tree				
Abies balsamea (L.) Mill.	31.9	17.4	257.6	141.6
Acer rubrum L.	90.9	39.0	3.741.3	1,560.0
Betula papyrifera Marsh	109.3	51.4	3,142.8	1,467.3
Picea glauca (Moench) Voss.	17.4	-	149.4	-
Picea mariana (Mill.) B.S.P.	177.6	91.5	2,074.6	1,317.3
Pinus banksiana Lamb.	1,114.7	814.0	21,922.7	14,230.8
Pinus resinosa Ait.	7,219.0	4,657.2	120,105.5	82,315.4
Pinus strobus L.	3,763.2	1,307.4	84,058.1	29,273.9
Populus grandidentata Michx.	10.1	-	531.5	-
Populus tremuloides Michx.	.8	-	34.2	-
Quercus rubra L.	47.2	27.4	760.6	462.3
Thuja occidentalis L.	34.8	-	294.9	-
Stratum total	12,616.9		237,073.2	
Sapling				
Abies balsamea (L.) Mill.	12.9	8.4	109.2	70.9
Acer rubrum L.	82.0	51.9	1,266.1	844.7
Betula papyrifera Marsh.	15.7	12.3	631.5	495.4
Picea glauca (Moench) Voss.	2.7	1.8	17.2	10.9
Picea mariana (Mill.) B.S.P.	52.5	30.7	291.1	177.1
Pinus banksiana Lamb.	8.8	6.5	85.6	62.3
Pinus resinosa Ait.	22.2	14.1	219.2	139.9
Pinus strobus L.	36.6	16.4	651.0	293.5
Quercus rubra L.	34.1	18.4	325.2	177.4
Thuja occidentalis L.	12.2	-	60.7	-
Stratum total	279.7		3,656.8	
Tree seedling				
Abies balsamea (L.) Mill.	2.1	1.7	4.5	3.6
Acer rubrum L.	7.2	3.9	96.9	47.8
Betula papyrifera Marsh.	.6	.4	11.9	9.0
Picea glauca (Moench) Voss.	6.1	4.4	12.0	9.2
Picea mariana (Mill.) B.S.P.	34.0	18.1	63.0	32.1
Pinus resinosa Ait.	1.8	1.1	13.3	8.4
Pinus strobus L.	21.6	9.4	158.0	69.2
Populus tremuloides Michx.	.8	.3	4.4	1.7
Quercus rubra L.	13.2	5.9	66.4	31.3
Sorbus americana Marsh.	.4	.3	2.2	1.5
Stratum total	87.8		432.6	
Tall shrub				
Alnus crispa (Ait.) Pursh.	10.7	5.0	77.5	36.0
Amelanchier Medic. spp.	5.1	3.8	56.0	38.8
Corylus cornuta Marsh.	29.8	18.0	156.8	95.6
Lonicera canadensis Marsh.	.1	-	.2	-
Salix bebbiana Sarg.	.7	.5	2.5	2.4
Stratum total	46.4		293.0	
Low shrub				
Arctostaphylos Uva-ursi (L.) Spreng.			5.8	-
Chimaphila umbellata (L.) Bart.			1.0	.7
Comptonia peregrina B.&B. Small. Rydb.			.2	.2
Diervilla Lonicera Mill.			2.0	1.0
Gaultheria procumbens L.			33.2	13.1
Juniperus communis L.			89.0	59.7
Vaccinium angustifolium Ait.			150.6	53.9
Vaccinium myrtilloides Michx.			53.7	25.3
Stratum total			335.5	

(Table 13 continued on next page)

(Table 13.--continued)

	BWCAW MATURE (n = 6)			
	Foliage		Total	
Stratum/species	$\bar{X}$	SE	$\bar{X}$	SE
Anemone quinquefolia L.	<0.1	-		
Aralia nudicaulis L.	6.0	3.9		
Aster macrophyllus L.	38.9	22.7		
Carex L. spp.	4.5	3.2		
Clintonia borealis (Ait.) Raf.	1.7	1.4		
Cornus canadensis L.	7.1	3.3		
Goodyera repens (L.) R. Br.	.1	.1		
Goodyera tesselata Lodd.	.2	-		
Grasses	32.8	21.2		
Linnaea borealis L.	.5	-		
Maianthemum canadense Desf.	6.8	1.0		
Melampyrum lineare Desr.	6.0	2.2		
Streptopus roseus Michx.	.1	-		
Trientalis borealis Raf.	.2	.1		
Stratum total	105.0			
Fern and fern allies				
Lycopodium annotinum L.	.6	-		
Lycopodium clavatum L.	.9	.6		
Lycopodium obscurum L.	1.0	-		
Polypodium virginianum L.	.1	-		
Pteridium aquilinum (L.) Kuhn.	10.5	6.8		
Stratum total	13.1			
Moss				
Calliergonella schreberi (Willd., BR. & Sch.) Grout	788.5	207.5		
Dicranum Hedw. spp.	246.6	62.8		
Hypnum crista-castrensis Hedw.	.7	-		
Polytrichum Hedw. spp.	36.8	12.0		
Sphagnum L. spp.	16.1	-		
All other mosses	160.2	39.7		
Stratum total	1,248.9			
Lichen				
Cladonia mitis Sandst.	122.6	83.9		
Cladonia rangiferina (L.) Web	364.2	205.6		
Cladonia sylvatica (L.) Hoffm.	66.1	-		
All other lichens	62.2	36.8		
Stratum total	615.1			
Community total			243,773.2	

Table 14.--Aboveground ovendry biomass by species and stratum for the jack pine-fir community type of northeastern Minnesota

(In Kg/ha)

	Prayer Lake Fire 1 n = 2				Little Sioux Fire 1 n = 2				3 n = 2				5 n = 2				1-5 n = 2		
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Tota
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$
Tree																			
Abies balsamea (L.) Mill.																			
Acer rubrum L.																	13.1	-	188.4
Betula papyrifera Marsh.																	4,328.9	2,714.6	95,155.8
Fraxinus nigra Marsh.																			
Picea glauca (Moench) Voss.																			
Picea mariana (Mill.) B.S.P.																			
Pinus banksiana Lamb.																			
Pinus resinosa Ait.																			
Pinus strobus L.																			
Populus balsamifera L.																			
Populus grandidentata Michx.																			
Populus tremuloides Michx.																			
Thuja occidentalis L.																	840.8	-	42,472.2
Stratum total																	5,182.8		137,816.4
Sapling																			
Abies balsamea (L.) Mill.																			
Acer rubrum L.																			
Betula papyrifera Marsh.																			
Fraxinus nigra Marsh.																			
Picea glauca (Moench) Voss.																			
Picea mariana (Mill.) B.S.P.																			
Pinus banksiana Lamb.																			
Pinus strobus L.																			
Populus balsamifera L.																			
Populus grandidentata Michx.																			
Populus tremuloides Michx.																			
Sorbus americana Marsh.																			
Stratum total																			

	Prayer Lake Fire 1 n = 2				Little Sioux Fire 1 n = 2				3 n = 2				5 n = 2				1-5 n = 2		
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		To
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$
Tree seedling																			
Abies balsamea (L.) Mill.																			
Acer rubrum L.													7.3	-	17.1	-			
Betula papyrifera Marsh.			<0.1	-					16.6	-	47.1	-	64.8	-	290.6	-	0.5	-	0.2
Larix laricina (DuRoi) K. Koch																			
Picea glauca (Moench) Voss.																			
Picea mariana (Mill.) B.S.P.																			
Pinus banksiana Lamb.			10.1	2.0			1.0	0.4	48.6	21.4	75.7	35.9	405.6	206.4	721.1	365.2			
Pinus strobus L.																			
Populus balsamifera L.																			
Populus grandidentata Michx.							285.9	-	46.7	-	141.5		1,205.7	1,169.4	5,218.0	5,098.4			
Populus tremuloides Michx.			5.0	4.2			170.4	170.3	381.1	380.9	1,573.0	1,572.6	386.5	374.9	2,683.4	2,647.1	278.1	99.0	1,914.3
Quercus rubra L.																			
Sorbus americana Marsh.																			
Thuja occidentalis L.																			
Tilia americana L.																			
Stratum total			15.2				457.3		493.0		1,837.3		2,069.9		8,930.2		278.6		1,916.3
Tall shrub																			
Acer spicatum Lam.																	36.9	6.6	618.5
Alnus crispa (Ait.) Pursh.															696.4	-	.2	-	.9
Alnus rugosa (DuRoi) Spreng.																			
Amelanchier Medic. spp.							5.4	-	28.8	15.9	80.9	46.6							
Cornus rugosa Lam.																			
Cornus stolonifera Michx.																			
Corylus cornuta Marsh.							60.5	39.9	153.8	106.8	332.4	245.0	161.2	66.4	421.6	184.4	80.0	15.9	689.7
Lonicera canadensis Marsh.																	1.4	-	10.1
Lonicera dioica L.																			
Lonicera hirsuta Eat.																			
Lonicera oblongifolia (Goldie) Hook.																			
Lonicera villosa (Michx). R.&S.																			

	Prayer Lake Fire 1 n = 2				Little Sioux Fire 1 n = 2				3 n = 2				5 n = 2				1-5 n = 2		
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$
Prunus pensylvanica L.F.							5.6	3.2	5.8	1.8	20.4	1.6	164.6	138.6	560.0	469.1	0.4	-	4.4
Prunus virginiana L.																	12.9	7.3	79.5
Rhus glabra																			
Salix bebbiana Sarg.																			
Salix L. spp.													18.1	-	48.8	-			
Viburnum edule (Michx.) Raf.																			
Viburnum rafinesquianum Schult.																			
Stratum total							71.5		205.0		480.3		343.9		1,726.8		131.8		1,403.
Low shrub																			
Arctostaphylos Uva-ursi (L.) Spreng.																			
Chimaphila umbellata (L.) Bart.							.8	.6			1.8	1.7			2.8	1.4			
Comptonia peregrina B.&B. Small. Rydb.							30.6	23.3			666.8	238.2			968.5	374.3			
Diervilla Lonicera Mill.			8.6	3.4			2.0	1.8							5.1	-			1.(
Gaultheria hispidula (L.) Muhl.																			
Gaultheria procumbens L.			.1	-			4.2	-			23.5	21.9			18.0	15.0			
Juniperus communis L.																			
Ledum groenlandicum Oeder.																			
Ribes americanum											<.1	-							
Ribes glandulosum Grauer.																			
Ribes triste Pall.																			
Ribes L. spp.																			
Rosa blanda Ait.																			
Rosa acicularis Lindl.															14.4	7.2			
Rubus parviflorus Nutt.																			
Rubus pubescens Raf.															.5	-			
Rubus strigosus Michx.			.1	-			.5	.1			1.8	1.2			44.9	-			147.
Vaccinium angustifolium Ait.			1.1	.9			5.4	.4			41.3	19.5			9.3	2.3			<.
Vaccinium myrtilloides Michx.			1.2	-			3.6	3.2			7.2	3.4			38.8	.1			
Stratum total			11.1				47.1				742.5				1,102.3				149.

Isabella Plantations																Cherokee-Frost Lake				BWCAW			
6-10 n = 2				16-20 n = 2				21-25 n = 2				26-30 n = 2				33 n = 16				MATURE n = 10			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
26.0	-	216.8	-													175.7	114.9	1,426.6	904.6	849.2	293.2	6,680.3	2,293.8
26.0	-	511.4	-																	28.4	19.5	1,256.3	955.3
				3.8	-	176.9	-	807.2	336.5	18,200.0	6,109.4	17.5	16.0	500.8	425.0	501.2	155.0	19,284.4	6,038.1	232.6	89.1	5,613.9	2,089.4
																				1.2	-	29.8	-
1,819.8	-	17,229.8	-	479.2	450.4	3,108.8	2,938.1	3,654.6	1,871.0	28,686.1	10,449.2	88.4	-	736.2	-	388.3	281.6	2,547.8	1,875.8	554.5	349.3	4,934.7	3,131.5
				62.0	-	359.8	-	26.1	19.3	177.8	149.0	6,362.4	-	165,038.7	-	78.9	45.4	343.7	192.8	788.5	318.3	6,288.1	2,858.7
333.6	28.3	4,849.5	1,989.9	1,103.6	802.3	25,667.9	2,183.8	1,480.0	1,080.2	21,712.5	13,138.7	975.9	861.8	15,266.5	13,134.3	6,473.8	1,324.5	88,100.0	16,242.7	4,730.1	898.1	92,429.0	17,284.8
222.4	214.7	1,879.8	1,806.6	3,071.9	2,364.4	37,029.5	29,892.0	828.8	405.7	8,875.5	4,067.4	3,591.6	1,026.6	42,133.5	13,346.7					21.4	-	288.6	-
								40.9	-	807.4	-					1.6	-	25.4	-	168.6	148.7	3,759.3	3,329.9
																				7.8	6.1	366.3	288.1
																				12.3	-	967.6	-
45.6	40.5	915.6	849.7	432.6	342.5	10,243.9	8,425.7	93.9	50.6	2,187.4	1,222.0	67.7	1.4	1,840.9	461.4	285.3	134.5	10,001.6	4,890.4	762.8	297.3	44,817.3	18,450.1
2,473.4		25,602.9		5,153.1		76,586.8		6,931.5		80,646.7		11,103.5		225,516.6		7,904.8		121,729.6		33.0	23.6	307.7	219.2
																				8,190.4		168,279.0	
																9.0	6.1	80.6	54.0	352.3	135.7	2,985.4	1,146.2
																1.8	1.4	23.3	17.2	6.5	5.3	111.9	96.2
																104.5	32.3	4,404.3	1,379.2	26.9	8.5	1,007.3	307.4
																				<.1	-	2	-
																.4	-	1.9	-	29.2	16.1	187.9	101.4
																151.6	105.0	862.2	604.1	376.4	240.1	2,091.6	1,305.2
																1,091.6	457.3	10,623.8	4,463.9	165.3	75.3	1,679.4	780.1
																				.7	.6	12.1	11.2
																				2.5	-	65.8	-
																				.6	.3	24.4	13.5
																73.2	43.8	1,601.3	975.0	26.9	15.0	653.3	363.6
																.8	.5	5.0	3.6	.4	.3	4.0	2.8
																1,432.1		17,602.4		987.6		8,823.3	

Isabella Plantations																Cherokee-Frost Lake				BWCAW			
6-10 n = 2				16-20 n = 2				21-25 n = 2				26-30 n = 2				33 n = 16				MATURE n = 10			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
																55.8	17.1	130.6	40.2	62.5	24.2	146.3	56.6
0.1	-	0.8	-	0.7	-	6.2	-									.2	.1	3.6	1.4	2.5	1.2	33.9	15.7
																11.1	3.4	271.8	88.9	.6	.2	10.9	4.4
																				<.1	-	.2	-
																18.1	8.7	34.8	16.9	8.3	5.5	15.1	10.6
																70.8	17.3	136.2	33.4	14.2	7.9	27.4	15.3
																.4	.3	2.8	2.2				
																.2	.1	1.4	.8	.5	.3	3.2	1.9
																				.7	-	4.1	-
11.1	9.7	78.8	61.0	10.8	-	79.2	-					1.7	1.4	19.3	11.5	3.1	1.4	17.2	7.3	9.4	3.4	59.4	24.3
																				.3	.2	1.3	.9
																1.7	.5	9.1	2.8	1.8	1.4	16.8	14.5
																2.5	1.6	4.3	2.6	1.6	.9	2.9	1.7
11.2		79.6		11.5		85.4						1.7		19.3		163.9		612.0		102.5		321.6	
								<.1	-	.3	-					9.2	6.0	68.5	52.2	79.4	53.4	652.7	449.2
				15.0	-	136.5	-	107.5	89.4	1,006.1	843.8	74.1	10.3	709.6	103.2	12.1	6.2	113.1	57.2	15.5	12.4	121.1	101.4
																<.1	-	<.1	-	<.1	-	<.1	-
4.6	1.3	25.8	7.1	20.7	8.0	157.3	44.1	6.8	-	47.2	-	37.2	36.1	376.7	370.1	2.6	2.5	26.2	24.3	10.7	6.0	107.2	55.8
				13.2	-	66.6	-	.7	-	2.6	-	.1	-	.3	-	<.1	-	.1	-	12.0	11.5	67.4	66.2
																				<.1	-	<.1	-
11.6	3.3	95.7	15.9	168.0	13.2	1,473.8	69.9	34.4	24.0	326.9	229.5	61.5	24.1	562.9	221.3	10.8	5.4	62.7	36.6	96.9	44.0	614.3	276.5
<.1	-	10.5	-	.4	-	1.5	-	.1	-	1.2	-					.3	.2	1.6	1.4	2.2	.9	6.9	2.9
.4	<.1	1.1	.5	1.7	-	27.4	-	2.6	-	9.2	-									<.1	-	.1	-
												<.1	-	.2	-								
												.2	-	1.2	-					<.1	-	<.1	-

Isabella Plantations																Cherokee-Frost Lake				BWCAW			
6-10 n = 2				16-20 n = 2				21-25 n = 2				26-30 n = 2				33 n = 16				MATURE n = 10			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
2.2	-	25.4	-	2.9	-	30.9	-					<0.1	<0.1	0.6	0.2	30.3	13.8	385.1	263.0	<0.1	-	<0.1	-
5.7	-	26.2	-	4.4	-	31.0	-									<.1	-	<.1	-	4.7	-	75.1	-
																				<.1	-	<.1	-
																35.9	12.4	635.7	288.2	.1	.1	.1	<.1
.1	-	.2	-	<.1	-	<.1	-	.1	-	.2	-	112.1	45.6	1,174.0	299.8	1.3	-	11.2	-	9.7	-	311.6	-
																<.1	-	.3	-				
24.7		184.9		226.4		1,925.1		152.3		1,393.7		285.3		2,825.5		102.7		1,304.5		1.8	-	21.4	-
																				231.2		1,978.0	
										13.1	-											.4	-
						2.9	-			4.3	-			2.4	-			3.1	1.5			.3	.2
		16.8	-											16.3	-							.4	-
		42.3	41.0			51.3	28.5			11.2	-			40.5	9.6			21.3	7.6			43.2	27.6
																						2.4	1.6
														30.3	4.1							3.4	2.2
										.5	-							.8	-			16.1	-
																				.2	-	.3	-
																		<.1	-			<.1	-
																						<.1	-
																		.2	-			<.1	-
														4.7	-								
		13.5	12.9			12.8	8.1			30.3	.8			24.9	10.8			5.1	2.3			6.4	3.6
																						7.0	4.6
		.6	-			3.6	.7			2.7	2.4			.1	.1			3.9	1.7			3.5	1.6
		86.2	65.1			8.8	2.7			54.0	52.6			26.9	17.4			1.9	.8			4.7	2.2
		.2	.1			18.8	18.7			10.8	6.4			30.9	7.2			.1	.1			8.7	3.7
		6.6	-			23.1	1.2			53.7	4.7			13.4	-			3.6	2.3			5.7	2.7
		166.2				121.3				180.6				190.4				40.1				102.3	

(Table 14 continued on next page)

Table 16 --continued

	Prayer Lake Fire				Little Sioux Fire											
	1 n = 2				1 n = 2				3 n = 2				5 n = 2			1-5 n = 2
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	Foliage
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$ SE	$\bar{x}$
Herbs																
Actaea rubra Ait. Willd.																
Anaphalis margaritacea (L.) B. & H.																
Anemone quinquefolia L.					<0.1	-			0.2	-						<0.1 -
Antennaria spp.	<.1	-														<.1 -
Aplectrum hyemale (Muhl.) Nutt.					.6	-										5.0 -
Aralia hispida Vent.	.1	-			.2	.1			26.2	-			41.5	-		
Aralia nudicaulis L.					6.4	4.2			39.3	6.7			37.6	33.5		2.5 1.9
Aster ciliolatus Lindl.																
Aster macrophyllus L.	75.6	-			289.4	3.1			284.6	17.8			241.5	100.7		82.9 9.5
Aster spp.	1.2	.1			74.2	28.4			183.0	122.6			15.4	13.2		
Bromidea algida (Sw.) Trin. ex Rupr.																
Calamagrostis canadensis (Michx.) Beauv.					7.4	4.6			32.2	13.5			33.5	7.3		4.8 -
Carex aperta Boott																
Carex brunnescens (Pers.) Poir.					17.6	13.4			71.1	35.9			83.1	78.2		1.5 -
Carex canadensis L.																
Carex communis Bailey	18.2	17.2							4.5	-						
Carex deflexa Hornem.	8.6	4.0														
Carex gynocrates Wormsk.																5.6 4.2
Carex interior Bailey																2.8 .9
Carex lanuginosa Michx.																<.1 -
Carex leptalea Wahlenb.	197.9	90.6	197.9	80.6	13.6	-			<.1	-						
Carex pensylvanica Lam.									.1	-						
Carex tenuiflora Wahlenb.																
Cinna latifolia (Trev. ex Goepp.) Griseb.	-	-			6.6	4.0			120.4	49.2			53.6	37.6		65.5 15.0
Dactylis glomerata L.																
Deschampsia caespitosa (L.) Beauv.																7.8 6.3
Elymus canadensis L.																
Elymus diffusus Hook.																
Elymus glaucus Buckl.																
Elymus hystrix L.																
Elymus innovatus Beal																
Elymus interruptus Buckl.																
Elymus riparius Wiegand																
Elymus spp.																
Epilobium angustifolium L.					1.2	.5			40.4	34.6			37.5	29.5		
Epilobium ciliatum Raf.																
Equisetum arvense L.	-	-			3.0	2.2			32.6	10.4			20.4	2.8		2.1 1.0

	Prayer Lake Fire				Little Sioux Fire											
	1 n = 2				1 n = 2				3 n = 2				5 n = 2			1-5 n = 2
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	Foliage
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$ SE	$\bar{x}$
Herbs (cont.)																
Melampyrum lineare Desr.									0.2	-			1.4	-		
Mentha L. spp.	3.0	-														
Mitella nuda L.																
Moneses uniflora (L.) Gray																
Petasites palmatus (Ait.) Gray																
Polygala paucifolia Willd.																
Polygonum cilinode Michx.	7.8	7.1			2.2	-			15.8	13.2			.8	0		<0.1 0
Pyrola asarifolia Michx.																
Pyrola elliptica Nutt.																
Pyrola secunda L.																
Pyrola virens Schweigg.																
Pyrola L. spp.					.1	-			.8	-						
Solidago glomerata Michx.																
Streptopus roseus Michx.																.2 -
Taraxacum Hill spp.																
Trientalis borealis Raf.					.5	-							1.0	.1		<.1 <.1
Trifolium repens L.																
Vicia americana Muhl.																
Vicia L. spp.																.2 -
Waldsteinia fragarioides (Michx.) Tratt.																
Stratum total	325.7				423.0				851.4				567.3			181.0
Fern and fern allies																
Athyrium filix-femina (L.) Roth.																
Dryopteris Phegopteris (L.)																
Dryopteris spinulosa (O.F. Mue. ex Watt																
Equisetum sylvaticum L.																
Equisetum L. spp.																
Gymnocarpium Dryopteris (L.) Newm.																
Lycopodium annotinum L.																
Lycopodium flexuosum L.																
Lycopodium lucidulum L.					.1	-			23.8	-			11.2	-		

	Prayer Lake Fire				Little Sioux Fire											
	1 n = 2				1 n = 2				3 n = 2				5 n = 2			1-5 n = 2
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	Foliage
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$ SE	$\bar{x}$
Fern and fern allies (cont.)																
Lycopodium obscurum L.									13.4	3.6						<0.1 0
Osmunda claytoniana L.																
Polypodium virginianum L.																
Pteridium aquilinum (L.) Kuhn					203.1	136.1			261.1	56.4			215.6	68.6		9.7 -
Woodsia ilvensis (L.) R. Br.																
Stratum total					203.2				298.3				226.8			9.8
Moss																
Calliergonella schreberi (Willd. ex Brid.) Grout																
Drepanocladus Hedw. spp.																
Hylocomium splendens (Hedw.) B.S.G.																
Hypnum crista-castrensis Hedw.																
Polytrichum Hedw. spp.	2.3	1.9							.7	.6			.9	.1		
Sphagnum L. spp.																
All other mosses																
Stratum total	2.3								.7				.9			
Lichen																
Cladonia mitis Sandst.																
Cladonia rangiferina (L.) Web.																
Cladonia sylvatica (L.) Hoffm.																
All other Lichen																
Stratum total																
Unidentified plants	.1	0			<.1	-										
Community total			354.4				1,202.2				4,210.5				12,554.3	141,476.5

| Isabella Plantations | | |

Table 15.--Aboveground ovendry biomass by species and stratum for the jack pine-black spruce community type of northeastern Minnesota

(In kg/ha)

	Little Sioux Fire																			
	1 n = 1				3 n = 1				5 n = 1				6-10 n = 6				11-15 n = 4			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Tree																				
Abies balsamea (L.) Mill.													156.0	154.0	1,171.5	1,156.8	1.9	-	16.8	
Acer rubrum L.													1.5	-	23.6	-				
Betula papyrifera Marsh.													2,305.5	2,298.9	46,523.0	46,294.4	108.3	63.4	5,596.9	1,164
Picea glauca (Moench) Voss.													62.6	42.6	468.6	355.1	5.0	-	32.5	
Picea mariana (Mill.) B.S.P.													243.0	159.4	1,763.4	1,262.4	275.9	228.7	2,411.6	2,064
Pinus banksiana Lamb.													894.8	271.1	12,026.4	5,014.7	2,117.6	645.2	21,346.2	6,049
Pinus resinosa Ait.													48.9	35.4	471.7	316.5	1,074.7	876.0	10,481.4	8,712
Pinus strobus L.																				
Populus grandidentata Michx.																				
Populus tremuloides Michx.													176.7	72.5	8,371.1	5,047.7	149.5	120.5	3,397.8	2,868
Quercus rubra L.																				
Thuja occidentalis L.																				
Stratum total													3,889.0		70,819.3		3,732.9		43,283.2	
Sapling																				
Abies balsamea (L.) Mill.																				
Acer rubrum L.																				
Betula papyrifera Marsh.																				
Picea glauca (Moench) Voss.																				
Picea mariana (Mill.) B.S.P.																				
Pinus banksiana Lamb																				
Pinus resinosa Ait.																				
Pinus strobus L.																				
Populus grandidentata Michx.																				
Populus tremuloides Michx.																				
Quercus rubra L.																				
Sorbus americana Marsh.																				
Thuja occidentalis L.																				
Stratum total																				

	Little Sioux Fire																			
	1 n = 1				3 n = 1				5 n = 1				6-10 n = 6				11-15 n = 4			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Tree seedling																				
Abies balsamea (L.) Mill.																				
Acer rubrum L.									4.0		16.2									
Betula papyrifera Marsh.									342.2		1,221.4		3.9	2.0	41.9	24.3	0.5	0.2	1.7	0.
Picea glauca (Moench) Voss.																				
Picea mariana (Mill.) B.S.P.							<0.1													
Pinus banksiana Lamb.			1.4		60.7		95.8		658.4		1,387.8									
Pinus resinosa Ait.																				
Pinus strobus L.																				
Populus grandidentata Michx.					.9		1.4		251.5		1,265.7									
Populus tremuloides Michx.			34.9		13.9		34.2		53.0		235.8		31.5	15.4	227.0	108.4	24.1	18.4	183.8	134.
Quercus rubra L.																				
Sorbus americana Marsh.											310.6		<.1	-	.1	-				
Thuja occidentalis L.																				
Stratum total			36.3		75.5		131.5		1,309.1		4,437.5		35.5		269.0		24.6		185.5	
Tall shrub																				
Acer spicatum Lam.													10.2	6.5	121.7	68.2				
Alnus crispa (Ait.) Pursh.													180.7	100.8	1,673.9	937.6	46.2	16.8	415.2	153
Alnus rugosa (DuRoi) Spreng.																				
Amelanchier Medic. spp.			14.5										7.5	2.9	57.0	25.0	29.9	6.2	269.5	75.
Cornus rugosa Lam.																				
Cornus stolonifera Michx.													4.3	-	27.7	-				
Corylus cornuta Marsh.													74.5	37.6	645.1	321.1	74.6	29.6	678.4	260.
Lonicera canadensis Marsh.													1.2	.5	8.6	3.3	2.4	1.4	17.9	9.
Lonicera dioica L.													.2	-	.2	-				
Lonicera hirsuta Eat.													.4	.3	1.2	.8	.1	-	.2	
Lonicera oblongifolia (Goldie) Hook.													.2	.2	.8	.5				
Prunus pensylvanica L.F.			.5		12.6		28.7		84.8		396.2		14.9	6.7	151.2	67.5	12.3	5.4	124.0	51
Prunus virginiana L.													7.1	-	47.7	-	3.0	-	14.3	

	Little Sioux Fire																			
	1 n = 1				3 n = 1				5 n = 1				6-10 n = 6				11-15 n = 4			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	
Tall shrub (cont.)																				
Rhamnus alnifolia L'Her.																				
Salix bebbiana Sarg.																				
Salix L. spp.													11.9	6.8	84.6	54.9	2.7	1.6	14.5	
Viburnum rafinesquianum Schult.																				
Stratum total			15.0		26.9		80.5		84.8		396.2		313.1		2,819.7		171.2		1,534.0	
Low shrub																				
Arctostaphylos Uva-ursi (L.) Spreng.															4.4	-				
Chimaphila umbellata (L.) Bart.															5.1	3.4				
Comptonia peregrina (L.) Coult.			37.2				201.1				113.0				17.6	11.4			25.5	1
Diervilla Lonicera Mill.			5.3				239.6				74.8				18.1	9.2			60.0	4
Gaultheria hispidula (L.) Muhl.																				
Gaultheria procumbens L.			7.3				21.1				47.1									
Juniperus communis L.																				
Ledum groenlandicum Oeder.															<.1	-				
Ribes L. spp.															9.5	9.4				
Rosa blanda Ait.																			.8	
Rosa acicularis Lindl.															34.1	14.7			24.5	1
Rubus parviflorus Nutt.																				
Rubus pubescens Raf.															3.0	2.2			2.5	
Rubus strigosus Michx.							27.3				15.2				79.0	21.1			39.6	1
Vaccinium angustifolium Ait.			12.0				240.3				101.2				4.3	3.2			50.0	2
Vaccinium myrtilloides Michx.			9.6				35.8				65.7				5.5	2.6			15.8	
Stratum total			71.4				765.2				1,417.0				180.7				218.7	

Isabella Plantations												Cherokee-Frost Lake				BWCAW			
16-20 n = 4				21-25 n = 3				26-30 n = 6				33 n = 3				MATURE n = 17			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
				153.2	-	1,178.1	-					173.7	-	1,402.4	-	52.2	32.4	416.6	259.7
																28.9	13.3	1,021.3	456.0
				1,008.7	884.3	21,386.5	17,343.0	204.6	97.1	5,396.9	2,235.2	307.0	293.6	12,681.3	11,989.5	72.7	33.9	1,993.6	976.2
136.5	94.4	988.4	681.8	262.8	-	2,114.3	-	34.8	-	288.0	-					70.1	36.9	545.4	272.4
339.5	-	2,816.6	-	416.0	356.6	2,962.8	2,665.1	7.5	-	41.5	-	82.9	-	466.2	-	3,891.9	664.9	30,865.7	5,364.6
641.2	266.5	12,463.3	7,813.0	664.5	294.1	10,595.0	5,549.3	3,598.0	1,595.8	58,030.5	26,973.2	8,631.0	4,949.8	101,547.7	50,134.3	5,401.6	701.2	101,136.5	12,660.6
5,502.4	779.1	57,614.4	8,610.8	3,245.1	104.3	35,601.1	5,123.5	4,625.5	1,235.9	54,860.7	14,983.8					496.9	290.4	6,726.8	3,956.4
												147.2	-	2,616.0	-	179.6	99.8	4,138.6	2,323.8
																10.1	7.3	773.5	565.4
285.1	235.4	7,361.0	6,232.5	403.8	362.2	25,896.8	24,278.6	235.5	218.1	8,322.1	7,780.9	102.9	-	4,004.2	-	127.2	29.8	6,069.6	1,458.8
																8.4	-	156.5	-
				.1	-	.1	-												
6,904.7		81,243.7		6,154.2		99,734.7		8,705.9		126,939.7		9,444.7		122,717.8		10,339.6		153,844.2	
																36.1	15.6	307.6	133.0
																10.0	4.9	177.4	95.2
												133.9	-	5,115.1	-	29.7	9.0	1,109.9	338.7
												10.3	-	60.1	-	15.7	10.2	100.5	65.1
												234.6	-	1,087.0	-	1,751.9	339.9	10,259.3	1,974.8
												854.0	-	8,143.9	-	70.5	34.2	750.4	371.7
																15.5	10.9	152.2	106.6
																2.9	1.8	52.2	32.0
																.3	-	10.0	-
																4.7	2.2	124.3	59.0
																.3	-	2.5	-
												.2	.2	.6	.4				
												1,233.0		14,406.7		1,937.6		13,046.4	

Isabella Plantations												Cherokee-Frost Lake				BWCAW			
16-20 n = 4				21-25 n = 3				26-30 n = 6				33 n = 3				MATURE n = 17			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
						16.2	-					61.4	34.6	137.6	80.3	13.1	4.2	30.7	9.6
												.1	-	2.6	-	5.6	2.2	98.7	40.9
0.2	0.1	1.1	0.8					0.1	0.1	0.2	0.2	9.3	1.8	246.7	44.4	.6	.2	13.1	5.9
												3.0	-	5.1	-	.2	.1	.3	.2
												45.6	30.7	86.5	60.6	23.2	6.0	42.0	11.3
												.2	-	1.2	-	.1	-	.3	-
																<.1	-	.2	-
												.7	-	4.3	-	2.7	1.1	20.7	9.0
																.1	-	.6	-
11.2	8.4	65.6	43.4	1.1	1.0	11.5	9.7	.1	-	1.3	-					4.1	.9	25.1	6.0
																.2	.2	1.0	.7
				.8	-	5.4	-					3.2	1.6	16.3	7.9	1.3	.7	8.0	4.8
												1.6	-	2.6	-				
11.4		66.7		7.3		63.1		.2		1.5		125.0		502.9		51.1		240.7	
				9.5	5.5	117.2	63.5	10.3	-	95.6	-	2.2	2.1	9.0	8.7	1.0	.8	8.2	7.9
98.5	69.4	965.5	684.9	180.9	111.8	1,874.5	1,213.6	52.2	15.1	509.3	155.4					6.1	4.1	48.2	32.3
				11.7	-	128.2	-												
38.0	13.6	320.1	132.1	25.1	17.2	239.8	185.2	29.1	18.2	279.2	196.2	<.1	.1	.7	.1	.4	.2	6.3	3.1
								3.0	-	16.4	-								
97.4	20.3	889.2	178.4	276.0	183.5	2,304.2	1,515.0	246.8	42.6	2,092.5	351.8	33.2	32.8	200.0	199.6	15.3	10.7	90.8	65.9
2.1	1.4	14.4	9.8	.7	-	4.4	-	3.4	1.9	21.3	12.2	.4	.3	1.2	1.0	.5	.2	1.6	.8
								.5	-	4.8	-					.1	.1	.1	.1
.2	-	.8	-	<.1	-	.1	-	.6	.4	2.3	1.5								
2.5	-	25.8	-	2.6	-	26.1	-	1.1	.5	11.9	5.2	4.8	4.8	36.3	36.0	<.1	.1	<.1	<.1
9.9	-	89.1	-	3.1	2.6	17.8	15.9												

Isabella Plantations												Cherokee-Frost Lake				BWCAW			
16-20 n = 4				21-25 n = 3				26-30 n = 6				33 n = 3				MATURE n = 17			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
								4.2	-	28.6	-								
												0.1	0.1	0.2	0.1	2.3	1.9	28.6	26.8
				5.2	-	36.1	-	1.3	-	8.0	-								
				3.1	-	15.2	-												
248.6		8,304.9		518.0		4,763.6		352.5		3,069.9		40.8		247.2		25.8		183.8	
		3.4	-							.6	-			2.1	1.5			.3	.1
		2.9	-							.6	-								
		74.4	33.4			68.0	31.7			14.6	5.0			8.1	5.2			10.2	4.7
																		.6	.4
		5.7	-			8.0	5.4											10.5	3.4
										4.9	-							36.1	27.3
		.2	-																
		.7	-																
		22.3	10.6			5.6	3.0			8.0	2.2			2.2	-			1.2	.9
		1.2	.8			.3	.2			.4	.2			1.2	-			.1	.1
		25.2	9.0			10.2	5.0			9.7	5.1			.3	-			1.8	1.6
		20.8	11.4			19.3	11.2			3.6	1.3			.8	-			25.4	9.8
		32.6	12.5			9.5	8.3							8.4	-			4.0	1.9
		189.4				120.9				42.4				23.0				97.3	

Table 15 continued on next page.

(Table 15.--continued)

Little Sioux Fire

	1 n = 1				3 n = 1				5 n = 1				6-10 n = 6				11-15 n = 4		
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$
Herb																			
Actaea rubra (Ait.) Willd.													<0.1	-					
Anaphalis margaritacea (L.) C.B. Clarke													<.1	-			<0.1	-	
Anemone quinquefolia L.					0.2								<.1	<0.1			<.1	<0.1	
Antennaria neodioca Greene																			
Antennaria spp. Gaertn.													<.1	<.1					
Apocynum androsaemifolium L.													1.4	.8			.4	.2	
Aralia hispida Vent.	.7				383.6				55.1										
Aralia nudicaulis L.	1.4				21.9				26.6				3.8	1.4			11.0	6.5	
Aster ciliolatus Lindl.													.7	-					
Aster macrophyllus L.	88.3				278.6				184.1				45.7	30.1			87.6	49.3	
Carex L. spp.					124.1								<.1	<.1			<.1	-	
Clintonia borealis (Ait.) Raf.	8.8				12.7				28.9				8.1	5.4			11.4	5.8	
Coptis groenlandica (Oeder) Fern.																	<.1	<.1	
Cornus canadensis L.	41.4				227.7				255.9				9.5	5.2			12.9	2.8	
Epilobium angustifolium L.									2.5								.4	.2	
Fragaria vesca L.													2.9	1.3			1.6	.6	
Fragaria virginiana Duchesne.													8.1	3.1			3.2	.7	
Galium triflorum Michx.													<.1	<.1					
Geranium bicknellii Britt.	<.1				6.6														
Goodyera repens (L.) R. Br.																			
Goodyera tesselata Lodd.																			
Grasses	2.4				21.4				10.4				158.0	61.5			115.2	29.7	
Habenaria orbiculata (Pursh) Torr.																			
Hepatica americana (D.C.) Ker.													<.1	-					
Lactuca L. spp.													<.1	-					
Lathyrus ochroleucus Hook.													4.1	2.0			.7	-	
Lathyrus palustris L.													.2	-					
Lathyrus venosus Muhl.													.2	-					
Linnea borealis L.									.9				1.9	1.0			17.0	8.0	
Maianthemum canadense Desf.	5.4				34.1				11.3				2.4	1.0			5.8	1.9	
Melampyrum lineare Desr.									2.4				<.1	-					
Grasses																			

Little Sioux Fire

	1 n = 1				3 n = 1				5 n = 1				6-10 n = 6				11-15 n = 4		
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$
Herb (cont.)																			
Monotropa uniflora L.													<0.1	-					
Petasites palmatus (Ait.) Gray																			
Petasites vitifolius Rydb.													<.1	<0.1			<0.1	<0.1	
Polygala paucifolia Willd.																			
Polygonum cilinode Michx.	0.9				25.8				2.0										
Potentilla tridentata Soland.																			
Pyrola elliptica Nutt.																	.7	-	
Pyrola rotundifolia L.																			
Pyrola secunda L.													1.0	.6					
Pyrola virens Schweigg.													.4	-					
Pyrola L. spp.									.4										
Senecio L. spp.													<.1	-					
Solidago L. spp.													<.1	<.1			<.1	-	
Streptopus roseus Michx.													.1	<.1			<.1	<.1	
Taraxacum officinale Weber.																			
Trientalis borealis Raf.	.2												<.1	<.1			<.1	0	
Vicia americana Muhl.																			
Viola adunca J. E. Smith																	.1	-	
Viola L. spp.													.9	.3			.3	.2	
Waldsteinia fragarioides (Michx.) Tratt.																			
Stratum total	149.6				1,136.7				580.5				249.7				268.4		
Fern and fern allies																			
Dryopteris spinulosa (O.F. Muell.) Watt													.3	-			.1	-	
Lycopodium annotinum L.																			
Lycopodium clavatum L.																	<.1	<.1	
Lycopodium complanatum L.																	<.1	-	
Lycopodium lucidulum Michx.													<.1	-					
Lycopodium obscurum L.					34.1								<.1	<.1					
Polypodium virginianum L.																			
Pteridium aquilinum (L.) Kuhn.	273.7				403.0				599.8				11.1	8.2			11.6	6.8	
Stratum total	273.7				437.1				599.8				11.5				11.8		

Little Sioux Fire

	1 n = 1				3 n = 1				5 n = 1				6-10 n = 6				11-15 n = 4		
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		To
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$
Moss																			
Calliergonella schreber (Willd., BR. & Sch.) Grout																			
Dicranum Hedw. spp.																			
Hylocomium splendens (Hedw.) B.S.G.																			
Hypnum crista-castrensis Hedw.																			
Polytrichum Hedw. spp.					12.3				10.2										
All other mosses																			
Stratum total					12.3				10.2										
Lichen																			
Cladonia alpestris (L.) Rabenh.																			
Cladonia mitis Sandst.																			
Cladonia rangiferina (L.) Web.																			
Cladonia sylvatica (L.) Hoffm.																			
Peltigera aphthosa (L.) Willd.																			
All other lichens																			
Stratum total																			
Liverworts					<.1														
Unidentified	<.1		.1	-															
Community total			546.1				2,563.5				7,441.2				74,349.9				45,501.6

Isabella Plantations												Cherokee-Frost Lake				BWCAW			
16-20 n = 4				21-25 n = 3				26-30 n = 6				33 n = 3				MATURE n = 17			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
												0.2	-						
<0.1	<0.1			<0.1	<0.1			<0.1	<0.1							0.1	0.1		
												2.8	-						
<.1	-																		
.6	-							2.3	-			.8	-			.2	.2		
7.2	5.5			13.7	7.7			11.5	6.9			15.9	8.8			4.5	1.6		
52.5	14.0			99.8	38.1			40.8	15.4			78.0	59.2			35.5	7.3		
<.1	-							<.1	-			.9	-			2.1	1.3		
7.0	.2			22.8	11.1			4.4	1.5			3.2	1.4			3.1	1.3		
				<.1	-			<.1	<.1			.2	-			.2	-		
5.8	3.8			16.6	6.9			9.6	3.6			41.2	28.7			25.4	8.0		
												2.7	-						
1.8	-							4.1	3.4			.6	-			.6	.4		
2.8	1.4			2.2	-			.8	.5			1.5	1.0						
												.1	-						
																.4	.2		
												.4	-			.2	.2		
165.0	93.7			134.1	115.7			47.9	8.0			9.0	5.3			8.6	2.4		
																.2	-		
				.9	-			.7	-							.3	-		
5.8	4.3			5.8	4.7			10.9	4.9			29.5	25.1			12.7	4.4		
2.9	1.5			4.1	1.8			5.3	1.4			9.5	6.8			9.9	1.7		
																.4	.2		
<.1	-																		

Isabella Plantations												Cherokee-Frost Lake				BWCAW			
16-20 n = 4				21-25 n = 3				26-30 n = 6				33 n = 3				MATURE n = 17			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
																<0.1	-		
																.1	-		
<0.1	<0.1			<0.1	<0.1														
																.1	-		
																<.1	-		
2.7	.4			2.6	1.5							0.6	-			.1	0.1		
				.8	-											.1	.1		
.7	-							0.6	-										
.1	-			.8	.7							.9	-			.2	.1		
				<.1	-														
				<.1	-			<.1	-			.5	.5			<.1	.1		
																.1	-		
.3	-			.4	-														
								.2	.1			.2	.1			.1	1		
255.3				304.7				139.2				198.7				105.3			
								.1	-							.2	-		
								<.1	-							1.6	1.0		
<.1	-			<.1	0			<.1	-			14.5	12.8			3.7	1.8		
																.7	.6		
								<.1	-										
<.1	-			<.1	<.1			2.2	-			1.1	-			.6	.3		
																.5	.4		
49.1	28.4			77.4	-			28.1	22.8							15.5	6.3		
49.2				77.5				30.5				15.6				22.8			

Isabella Plantations												Cherokee-Frost Lake				BW AW			
16-20 n = 4				21-25 n = 3				26-30 n = 6				33 n = 3				MATURE n = 17			
Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
												386.5	241.1			1,920.9	239.8		
												25.1	9.5			212.3	32.2		
																20.5	12.4		
												.9	-			25.8	15.4		
												125.3	77.2			17.3	6.9		
												135.1	26.5			198.4	47.4		
												673.0				1,395.1			
																66.9	-		
																1.6	-		
												44.1	17.6			113.3	63.9		
												7.1	1.8			2.5	-		
												60.4	26.9			34.1	15.1		
												111.5				216.1			
		84,109.2				105,064.5				130,223.2				135,896.6				170,148.0	

Table 16.--Aboveground ovendry biomass by species and stratum for the black spruce-feather moss community type of northeastern Minnesota

(In Kg/ha)

	Isabella Plantations												BWCAW MATURE n = 19			
	11-15 n = 3				16-20 n = 3				21-25 n = 1							
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Tree																
Abies balsamea (L.) Mill.													871.8	298.7	6,946.4	2,382.7
Acer rubrum L.	5.9	-	66.2	-	62.0	56.6	874.7	810.4					1.1	-	45.4	-
Betula papyrifera Marsh.									1,297.6		31,235.0		396.5	158.1	9,494.7	3,540.5
Picea glauca (Moench) Voss.	1.3	-	7.4	-	335.0	-	2,332.9	-					455.3	159.1	3,986.4	1,365.0
Picea mariana (Mill.) B.S.P.	99.2	72.5	864.1	690.9					264.2		2,029.6		5,642.7	1,115.0	46,118.7	9,068.4
Pinus banksiana Lamb.	94.2	72.1	794.5	634.1	13.9	-	95.2	-	478.0		6,235.0		1,292.8	489.0	24,828.0	9,159.2
Pinus resinosa Ait.	1,648.5	650.3	16,669.2	6,699.7	1,365.2	853.3	14,681.7	9,041.1	1,149.6		12,950.1		188.6	139.4	2,451.7	1,804.4
Pinus strobus L.					3,561.4	-	39,939.7	-					207.7	98.1	4,528.7	2,121.4
Populus grandidentata Michx.					.4	-	11.2	-					8.6	7.1	624.2	534.1
Populus tremuloides Michx.	237.2	82.6	4,757.4	1,720.1	102.6	71.8	2,086.5	1,445.0					405.9	121.3	19,356.7	5,898.3
Sorbus americana Marsh.													.8	-	8.9	-
Thuja occidentalis L.													76.1	41.7	554.8	301.9
Stratum total	2,086.3		23,158.8		5,440.5		60,021.9		3,189.4		52,449.7		9,547.9		118,944.6	
Sapling																
Abies balsamea (L.) Mill.													465.1	188.0	3,922.6	1,583.3
Acer rubrum L.													2.0	1.4	33.5	24.5
Betula papyrifera Marsh.													65.2	16.3	2,416.4	605.0
Picea glauca (Moench) Voss.													13.5	7.2	84.8	44.9
Picea mariana (Mill.) B.S.P.													1,894.4	532.1	11,215.9	3,144.5
Pinus banksiana Lamb.													25.9	16.1	265.6	167.5
Pinus resinosa Ait.													1.1	.7	10.2	7.0
Pinus strobus L.													3.6	2.6	62.3	44.9
Populus grandidentata Michx.													1.4	1.2	57.6	49.7
Populus tremuloides Michx.													36.2	11.7	954.8	311.6
Sorbus americana Marsh.													.4	.3	3.3	2.4
Thuja occidentalis L.													34.0	16.8	160.2	80.4
Stratum total													2,542.8		19,187.2	

(Table 16 continued on next page)

(Table 16.--continued)

	Isabella Plantations												BWCAW MATURE n = 19			
	11-15 n = 3				16-20 n = 3				21-25 n = 1							
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Tree seedling																
Abies balsamea (L.) Mill.													55.2	13.8	119.5	30.2
Acer rubrum L.	0.2	-	1.8	-	40.8	40.3	346.2	342.1	4.4		9.4		.6	.4	11.9	9.1
Betula papyrifera Marsh.	.7	0.3	2.7	1.5	.6	-	8.5	-					1.6	.5	38.6	17.0
Fraxinus nigra Marsh.													.3	.2	1.3	.9
Picea glauca (Moench) Voss.													2.3	.8	3.8	1.4
Picea mariana (Mill.) B.S.P.													20.5	8.6	36.7	16.1
Pinus resinosa Ait.													.2	.2	2.1	1.9
Pinus strobus L.													1.1	.7	8.3	5.6
Populus tremuloides Michx.	48.4	8.1	340.0	46.1	36.4	25.8	280.5	195.6					4.9	1.8	28.1	11.3
Quercus rubra L.													.1	-	.4	-
Sorbus americana Marsh.													2.4	.5	12.8	2.7
Thuja occidentalis L.													35.0	33.6	76.8	74.3
Tilia americana L.																
Stratum total	49.3		344.5		77.8		635.2		4.4		9.4		124.2		340.3	
Tall shrub																
Acer spicatum Lam.													8.8	4.0	56.6	27.9
Alnus crispa (Ait.) Pursh.									110.9		1,057.1		9.5	4.6	68.4	32.8
Amelanchier Medic. spp.	11.3	11.0	69.7	68.2	16.6	8.5	120.0	61.4	29.6				4.1	3.3	48.3	37.4
Cornus rugosa Lam.	10.3	9.3	45.6	41.4	9.5	-	39.5	-					1.0	.9	5.0	4.8
Corylus cornuta Marsh.	42.2	13.4	371.7	114.6	53.3	21.8	475.5	195.4	121.3		1,054.3		32.3	22.5	206.8	150.4
Lonicera canadensis Marsh.					.6	.5	4.5	3.6					1.6	.5	6.9	2.3
Lonicera hirsuta Eat.					.1	-	.2	-								
Lonicera oblongifolia (Goldie) Hook.	2.9	-	11.6	-	.1	-	.2	-								
Lonicera villosa (Michx.) R.dS.													<.1	-	<.1	-
Prunus pensylvanica L.F.	11.4	10.9	101.3	94.8	13.3	12.4	139.4	126.9					.1	-	.9	.9
Prunus virginiana L.	2.4	-	12.0	-	7.2	-	37.2	-					.1	-	1.3	-
Salix bebbiana Sarg.													5.5	5.5	74.8	74.8
Salix L. spp.	10.9	-	83.2	-	70.9	47.7	790.4	595.7					2.5	2.3	20.9	20.1
Viburnum rafinesquianum Schult.													<.1	-	<.1	-
Stratum total	91.4		695.1		171.6		1,606.9		261.8		2,111.4		65.6		490.0	

(Table 16 continued on next page)

(Table 16.--continued)

	Isabella Plantations												BWCAW			
	11-15 n = 3				16-20 n = 3				21-25 n = 1				MATURE n = 19			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Low shrub																
Arctostaphylos Uva-ursi (L.) Spreng.											23.7				0.4	0.3
Chimaphila umbellata (L.) Bart.											9.6				.3	.1
Comptonia peregrina B.&B. Small. Rydb.															1.2	-
Diervilla Lonicera Mill.			45.6	23.5			58.1	31.5			48.2				17.0	8.9
Gaultheria hispidula (L.) Muhl.															.8	.4
Gaultheria procumbens L.			8.7	-			3.2	-			11.8				1.8	1.0
Juniperus communis L.															1.5	-
Ledum groenlandicum Oeder.															2.0	-
Ribes glandulosum Grauer.															<.1	-
Ribes lacustre (Pers.) Poir.															<.1	-
Ribes L. spp.			54.0	27.7			34.4	27.7			9.1				.6	-
Rosa acicularis Lindl.															1.8	.7
Rubus parviflorus Nutt.				.2			.6	.6			<.1				2.9	2.6
Rubus pubescens Raf.			100.7	66.0			102.3	81.3			.8				.8	.4
Rubus strigosus Michx.			4.8	4.5			12.7	7.9			35.9				23.8	17.9
Vaccinium angustifolium Ait.			17.4	11.2			1.1	-			1.9				26.4	17.3
Vaccinium myrtilloides Michx.			.2												4.7	2.9
Stratum total			231.4				212.4				141.1				86.1	
Herb																
Anaphalis margaritacea (L.) C.B. Clarke	<0.1	<0.1			<0.1	-							<0.1	-		
Anemone quinquefolia L.	<.1	-			<.1	-							.1	0.1		
Apocynum androsaemifolium L.	.8	.6			3.1	-							<.1	-		
Aquilegia canadensis L.					<.1	-										
Aralia nudicaulis L.	2.3	1.1			6.4	2.5			0.3				9.0	2.5		
Aster macrophyllus L.	92.4	14.9			86.0	29.0			8.3				36.4	13.0		
Carex L. spp.	<.1	-			<.1	-							.6	.3		

(Table 16 continued on next page)

(Table 16.--continued)

	Isabella Plantations												BWCAW			
	11-15 n = 3				16-20 n = 3				21-25 n = 1				MATURE n = 19			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Herb (cont.)																
Circaea alpina L.													0.1	-		
Clintonia borealis (Ait.) Raf.					2.9	2.3			6.9				4.2	1.4		
Coptis groenlandica (Oeder) Fern.													1.3	.6		
Cornus canadensis L.	2.5	-			7.9	-			26.9				21.8	5.7		
Epilobium angustifolium L.	1.0	0.9			.3	-							2.0	-		
Epigaea repens L.													.1	-		
Fragaria vesca L.					.6	-							.9	.5		
Fragaria virginiana Duchesne.	10.9	7.5											.7	.4		
Galium triflorum Michx.	.1	.1											.9	.8		
Goodyera repens (L.) R. Br.													.3	.1		
Goodyera tesselata Lodd.													.1	.1		
Grasses	141.6	49.0			77.8	55.0			18.4				12.4	5.2		
Habenaria Willd. SPD.													<.1	-		
Hepatica americana (D.C.) Ker.	<.1	-														
Lathyrus ochroleucus Hook.	41.9	16.4			2.4	-							.6	.5		
Lathyrus venosus Muhl.	8.9	4.8			23.7	-							.3	.2		
Lathyrus L. spp.	1.2	-														
Linnaea borealis L.	2.8	1.8											16.7	4.0		
Maianthemum canadense Desf.	.2	.1			6.1	4.3			8.3				7.2	1.4		
Melampyrum lineare Desr.					<.1	-							1.1	.5		
Mitella nuda L.													.4	.2		
Moneses uniflora (L.) Gray													<.1	-		
Petasites palmatus (Ait.) Gray													.3	-		
Polygala paucifolia Willd.	<.1	<.1			<.1	-							<.1	-		
Polygonum cilinode Michx.													.4	-		
Pyrola elliptica Nutt.													<.1	-		
Pyrola rotundifolia L.													<.1	-		
Pyrola secunda L.	2.1	1.1			.9	-							.1	.1		
Pyrola virens Schweigg.	.7	-							.1				.1	.1		
Solidago L. spp.	<.1	<.1														
Streptopus roseus Michx.					4.7	-							.3	.1		
Trientalis borealis Raf.	<.1	-											.3	.2		
Trillium cernuum L.													<.1	-		
Vicia americana Muhl.													.1	-		
Viola L. spp.	.4	-			.2	-							.4	.2		
Stratum total	309.9				223.1				69.2				119.2			

(Table 16 continued on next page)

(Table 16.--continued)

	Isabella Plantations												BWCAW			
	11-15 n = 3				16-20 n = 3				21-25 n = 1				MATURE n = 19			
	Foliage		Total		Foliage		Total		Foliage		Total		Foliage		Total	
	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE	$\bar{X}$	SE
Fern and fern allies																
Athyrium filix-femina (L.) Roth.													<0.1	-		
Dryopteris spinulosa (O.F. Muell.) Watt													.3	0.2		
Equisetum L. spp.													.1	-		
Gymnocarpium Dryopteris (L.) Newm.													.9	.6		
Lycopodium annotinum L.									<0.1				5.1	4.5		
Lycopodium clavatum L.	<0.1	-											2.4	1.1		
Lycopodium complanatum L.													.6	.4		
Lycopodium obscurum L.													1.8	1.0		
Polypodium virginianum L.													.1	-		
Pteridium aquilinum (L.) Kuhn.	288.1	61.8			82.9	42.4							11.5	6.8		
Stratum total	288.2				82.9				.1				22.9			
Moss																
Calliergonella schreberi (Willd., BR. & Sch.) Grout													1,310.0	182.9		
Dicranum Hedw. spp.													232.9	58.0		
Hylocomium splendens (Hedw.) B.S.G.													34.8	25.6		
Hypnum crista-castrensis Hedw.													26.1	10.0		
Polytrichum Hedw. spp.													46.4	20.5		
All other mosses													257.2	38.0		
Stratum total													1,907.4			
Lichen																
Cladonia mitis Sandst.													133.1	49.3		
Cladonia rangiferina (L.) Web.													52.1	27.2		
Cladonia sylvatica (L.) Hoffm.													.2	-		
Peltigera aphthosa (L.) Willd.													30.1	7.9		
All other lichens																
Stratum total													215.5			
Community total			25,027.9				62,782.4				54,781.8				141,313.2	

Table 17.--Aboveground ovendry biomass by species and stratum for the white-cedar community type of northeastern Minnesota

(In Kg/ha)

	BWCAW MATURE (n = 10)			
	Foliage		Total	
Stratum/species	$\bar{X}$	SE	$\bar{X}$	SE
Tree				
Abies balsamea (L.) Mill	2,863.5	736.2	22,121.0	5,776.6
Betula papyrifera Marsh.	3,756.8	389.5	73,613.1	7,074.5
Picea glauca (Moench) Voss.	707.4	220.0	7,038.8	2,273.8
Picea mariana (Mill.) B.S.P.	102.9	77.5	975.0	732.4
Pinus strobus L.	355.8	327.1	7,821.7	7,113.4
Populus tremuloides Michx.	325.8	283.6	17,961.8	15,940.9
Sorbus americana Marsh.	8.1	5.7	91.9	64.8
Thuja occidentalis L.	6,231.5	1,023.2	69,034.2	11,714.3
Stratum total	14,351.8		198,657.5	
Sapling				
Abies balsamea (L.) Mill.	665.1	318.5	5,616.6	2,677.3
Betula papyrifera Marsh.	52.4	27.8	1,875.1	974.2
Picea glauca (Moench) Voss.	2.2	1.6	14.9	11.2
Picea mariana (Mill.) B.S.P.	34.4	24.8	212.7	156.7
Pinus strobus L.	2.3	-	40.0	-
Populus tremuloides Michx.	18.1	-	455.9	-
Sorbus americana Marsh.	1.1	.5	11.6	4.8
Thuja occidentalis L.	822.0	337.9	3,964.5	1,640.3
Stratum total	1,597.6		12,191.3	
Tree seedling				
Abies balsamea (L.) Mill.	48.8	10.6	100.8	22.6
Betula papyrifera Marsh.	.7	.2	13.2	3.3
Fraxinus nigra Marsh.	.1	-	.3	-
Picea glauca (Moench) Voss.	2.3	.6	3.7	1.1
Picea mariana (Mill.) B.S.P.	1.8	1.4	3.1	2.5
Pinus strobus L.	.2	.1	1.2	.9
Populus tremuloides Michx.	.2	.2	1.1	-
Sorbus americana Marsh.	10.1	3.7	56.8	21.4
Thuja occidentalis L.	85.0	36.8	163.8	81.4
Stratum total	149.2		344.0	
Tall shrub				
Acer spicatum Lam.	206.9	45.3	2,166.0	573.1
Alnus crispa (Ait.) Pursh.	<.1	-	<.1	-
Amelanchier Medic. spp.	<.1	<.1	<.1	<.1
Cornus rugosa Lam.	<.1	-	.1	-
Corylus cornuta Marsh.	36.0	17.4	244.9	124.8
Lonicera canadensis Marsh.	2.1	.4	7.1	1.2
Lonicera villosa (Michx.) R.dS.	.1	-	.1	-
Prunus virginiana L.	<.1	<.1	<.1	<.1
Taxus canadensis Marsh.	12.8	8.8	23.2	16.0
Stratum total	258.0		2,441.5	

(Table 17 continued on next page)

(Table 17.-continued)

	BWCA MATURE (n = 10)			
	Foliage		Total	
Stratum/species	$\bar{X}$	SE	$\bar{X}$	SE
Low shrub				
Chimaphila umbellata (L.) Bart.			0.2	0.1
Diervilla Lonicera Mill.			2.5	2.2
Gaultheria hispidula (L.) Muhl.			.3	.2
Juniperus communis L.			.4	.3
Ribes americanum Mill.			<.1	-
Ribes glandulosum Grauer.			<.1	-
Ribes lacustre (Pers.) Poir.			<.1	-
Ribes triste Pall.			<.1	-
Rubus parviflorus Nutt.			11.4	6.6
Rubus pubescens Raf.			3.6	1.8
Rubus strigosus Michx.			.8	.7
Stratum total			19.3	
Herb				
Aralia nudicaulis L.	17.1	4.3		
Aster macrophyllus L.	10.7	3.5		
Carex L. spp.	7.6	3.7		
Circaea alpina L.	.6	.5		
Clematis viginiana L.	.1	-		
Clintonia borealis (Ait.) Raf.	9.3	2.2		
Coptis groenlandica (Oeder) Fern.	1.2	.4		
Cornus canadensis L.	11.3	2.3		
Galium triflorum Michx.	.7	.4		
Goodyera repens (L.) R. Br.	.3	.2		
Grasses	4.1	2.2		
Habenaria orbiculata (Pursh) Torr.	.5	-		
Impatiens capensis Meerb.	3.8	2.9		
Lathyrus ochroleucus Hook.	.2	-		
Linnaea borealis L.	6.1	3.2		
Maianthemum canadense Desf.	4.2	1.5		
Mertensia paniculata (Ait.) G. Don.	.7	-		
Mitella nuda L.	16.1	4.0		
Moneses uniflora (L.) Gray	.1	.1		
Oxalis montana Raf.	.5	.5		
Pyrola secunda L.	.6	.2		
Pyrola virens Schweigg.	.2	.2		
Streptopus roseus Michx.	2.7	1.6		
Trientalis borealis Raf.	2.1	1.1		
Viola L. spp.	1.8	.6		
Stratum total	102.6			
Fern and fern allies				
Athyrium filix-femina (L.) Roth.	0.7	-		
Botrychium virginianum (L.) Sw.	.6	-		
Cystopteris fragilis (L.) Bernh.	.1	-		
Dryopteris phegopteris L.	.1	-		
Dryopteris spinulosa (O.F. Muell.) Watt	11.0	4.7		
Gymnocarpium dryopteris (L.) Newm.	5.4	2.3		
Lycopodium annotinum L.	1.9	1.0		
Lycopodium clavatum L.	1.6	.8		
Lycopodium lucidulum Michx.	1.3	.8		
Lycopodium obscurum L.	1.9	1.6		
Stratum total	24.6			
Moss				
Calliergonella schreberi (Willd., BR. & Sch.) Grout	100.4	57.4		
Dicranum Hedw. spp.	8.5	4.7		
Hylocomium splendens (Hedw.) B.S.G.	44.3	19.5		
Hypnum crista-castrensis Hedw.	1.3	.5		
Polytrichum Hedw. spp.	5.4	4.3		
All other mosses	533.3	89.6		
Stratum total	693.2			
Lichen				
Cladonia rangiferina (L.) Web.	0.5	-		
All other lichens	16.9	7.7		
Stratum total	17.4			
Community total				214,491.4

Ohmann, Lewis F.; Grigal, David F.
Plant species biomass estimates for 13 upland community types of northeastern Minnesota. Resour. Bull. NC-88. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1985. 52 p.

Presents total aboveground ovendry biomass estimates by stratum and species for 13 plant community types located in northeastern Minnesota.

KEY WORDS: Plantation, biomass estimation, dry weight, silviculture, plant community.

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FUTURE TIMBER HARVESTS ON THE CHIPPEWA AND SUPERIOR NATIONAL FORESTS IN MINNESOTA

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The two national forests in Minnesota—the Chippewa and the Superior—contain about 15 percent of the commercial forest land in the northeasternmost 17 counties of the State. The timber harvest from these forests is critical to the local forest industries, partly because so much of the forest land in northern Minnesota has been withdrawn from commercial use (e.g. the Boundary Waters Canoe Area Wilderness and Voyageurs National Park). So there is much local and regional interest in the future demand for timber from the national forests. Our efforts to project these demands are reported here.

Aspen-birch is the predominant forest type in both these forests. The Chippewa covers 590,500 acres of forest land, of which 562,300 are commercial. About 46 percent of the Chippewa's commercial forest land is in the aspen-birch type, 16 percent is in various pine types, and 13 percent is in the spruce-fir type (Jakes and Raile 1980). The Superior National Forest covers 2,008,900 acres of which 1,152,800 acres are commercial. About 47 percent of the Superior National Forest's commercial forest land is in the aspen-birch type and 28 percent is the spruce-fir type (Spencer and Ostom 1979).

The pulp and paper industry has played a significant role in the northern Minnesota economy and has been a major consumer of national forest timber in Minnesota, primarily aspen. Aspen production has been increasing steadily over the last several decades and by 1982 amounted to 62 percent of the roundwood pulpwood harvested.

Sawmilling is less prominent in the area. About 230 million board feet of saw logs were produced in 555 sawmills in Minnesota in 1980. About 35 percent of the total saw log production was aspen; 34 percent was red pine, jack pine, white pine, and other softwood species; and 31 percent was red oak, elm, ash, and other hardwoods. About 86 percent of all Minnesota sawmills were located in 17 northern counties.

Fuelwood use in northern Minnesota increased approximately 450 percent from 1970 to 1980 (Minnesota DNR 1981b), although little of this has come from the growing stock of either the Chippewa or Superior National Forests.

Recent technological innovations combined with a readily available supply of aspen have led to a major expansion in the waferboard industry in northern Minnesota.

Other studies of the demand for timber look at a broader geographical area that includes the two National Forests. Regional forecasts of timber harvest are reported in "An Analysis of the Timber Situation in the United States, 1952-2030" (USDA 1982). This is a national document that cannot include local demand factors such as the waferboard industry of northern Minnesota. Rockel *et al.* (1983) have projected consumption levels of timber grown in northern Minnesota but do not detail timber harvest on the National Forests. Data Resources, Inc. (DRI) (1980) studied the demand for Minnesota timber but does not give detailed information for the National Forests. Our paper and the DRI study make similar assumptions regarding population growth and housing starts but use different forecasting methods. The DRI study analyzes regional data while our study synthesizes local demands. Erkkila *et al.* (1982) projected economic impacts of expansion of forest industries in northeastern Minnesota but did not include specific projections for the Superior National Forest. Other reports project consumption of wood residue (Minnesota DNR 1980), consumption of aspen (Jakes 1981), and consumption by particular end uses, such as fuelwood and waferboard (Minnesota DNR 1981a, Minnesota DNR 1981b, Carpenter 1981, Koch and Springate 1983).

METHODS

We followed the general procedure used by Rockel *et al.* (1983). Total harvest is divided into the harvest of pulpwood, sawtimber, and fuelwood by three species groups: softwoods, aspen, and other hardwoods. Trends within each of these groups are compared with trends within the same species and product groups within a larger geographical area, either northern Minnesota or the northern region of the United States. Estimates of harvests for each of the species and product groups are projected for selected years between 1985 and 2030.

Because data available for consumption of aspen by the waferboard industry are limited, a different model was used to generate forecasts of future consumption of aspen by this industry. The model does not attempt to differentiate between pulpwood and sawtimber size class used by the waferboard industry.

We base our projections on several assumptions. We assume a limited substitution of other species for aspen, particularly in the waferboard and pulp and paper industries. In estimating future population growth, we assume a fertility rate of 2.1 children per woman. Finally, we assume that timber growth rates on the National Forests will increase from 0.33 in 1985 to 0.42 cords per acre per year by 2030.

We chose the forecasting method for this study for two reasons. First, we assumed that the timber harvested on the Chippewa and Superior National Forests does not influence price. Connaughton and Haynes (1983) concur in this assumption when the National Forest's share of the market is small, as is the case here. The Superior National Forest controls a larger market share than does the Chippewa National Forest, yet it supplies only 12 percent of the timber harvested in northern Minnesota. Moreover, during 1980, 16.2 percent of the pulpwood harvested in Minnesota was exported to Wisconsin and 5.5 percent to other states (Blyth and Smith 1982), further diluting the ability of either National Forest to influence price. Second, data with which to build a sophisticated price-sensitive model are limited for a small regional study.

Other studies (Haynes 1977; Adams 1977; Haynes, Connaughton, and Adams 1981; Adams 1983) have used other approaches. However, these studies discuss demand (1) by region rather than by forest, (2) in areas where the Forest Service controls a larger share of the market, or (3) in areas where more data are available.

PULPWOOD HARVESTS

Together, the Chippewa and Superior National Forests supply approximately one-fifth of the pulpwood harvested in northern Minnesota. This is slightly more than the national forest share of commercial forest land in northern Minnesota. During the period from 1964 to 1981, the Chippewa National Forest pulpwood harvest ranged from 60 to 98 thousand cords, with no apparent trend. This amounted to an average of 7 percent of the northern Minnesota harvest (table 1). The Superior National Forest harvest over the same period has ranged from 86 to 178 thousand cords per year, an average of 12 percent of the northern Minnesota harvest, again with no apparent trend (table 1).

Rockel *et al.* (1983) projected pulpwood consumption of timber grown in northern Minnesota. Using their medium projections, and assuming the Chippewa and Superior National Forests will maintain 7 and 12 percent shares, respectively, of the pulpwood harvest in northern Minnesota, we calculated harvest projections for the Chippewa and Superior National Forest through 2030 (table 2).

Accordingly, we project that the pulpwood harvest could increase 83 percent, to 177,000 cords on the Chippewa National Forest and to 303,000 cords on the Superior National Forest by 2030. The largest increases will be in the aspen harvest—150 percent on both of the National Forests. Aspen could account for 84 percent of the total pulpwood volume harvested on each of the forests. Softwood harvest is projected to decline 40 percent. Although other hardwood harvests are projected to increase in approximately the same proportion as aspen, the total volume harvested will remain small: 10,000 cords on the Chippewa and 18,000 cords on the Superior by 2030. The similarity of trends in projected harvest of aspen and other hardwoods reflects a moderate substitution of other hardwoods for aspen by the industries that use aspen as a raw material.

SAWTIMBER HARVESTS

The sawtimber harvest has varied on the Chippewa and Superior National Forests (tables 3 and 4). It decreased from 1964 to 1978, but since then the trend has reversed and harvests are increasing.

Because only limited data are available for sawtimber harvests in northern Minnesota and the northern region of the United States, we could not compare them with the two National Forests. So, we simply assumed that total sawtimber harvest on the

Table 1.—*Harvest of pulpwood in northern Minnesota, and on the Chippewa and superior National Forests*

(In thousand cords)

Year	Northern Minnesota[1]	Chippewa National Forest		Superior National Forest	
		Volume[2]	Percent	Volume	Percent
1964	1,044	60	6	168	16
1965	998	62	6	154	15
1966	1,149	63	5	135	12
1967	1,148	75	7	145	13
1968	1,023	72	7	123	12
1969	1,127	69	6	95	8
1970	1,115	83	7	148	13
1971	1,083	79	7	165	15
1972	1,212	98	8	137	11
1973	1,219	73	6	143	12
1974	1,389	81	6	126	9
1975	1,220	63	5	152	12
1976	1,171	93	8	144	11
1977	1,173	82	7	105	9
1978	1,168	90	8	113	10
1979	1,281	96	8	138	11
1980	1,193	73	6	96	8
1981	1,232	65	5	86	7
Mean			7		12
Standard deviation			1		3

[1]Blyth (1966-1975); Blyth and Hahn (1976-1978); Blyth and Smith (1979-1982).

[2]U.S. Department of Agriculture, Forest Service. Unpublished reports on timber cut and sold from Region 9 National Forests, Milwaukee, WI.

Chippewa and Superior National Forests will increase in proportion to that in the northern region of the United States.

We assume the same forces that drive demand for sawtimber in the northern region of the United States drive demand on the Chippewa and Superior National Forests. So, the Chippewa and Superior National Forests mean shares of the northern region harvest (table 5) were used to project the sawtimber harvest on each National Forest through 2030 (table 6).

The mean species group share values from tables 3 and 4 and the total projected harvest levels from table 6 were used to project the species group harvest levels for each National Forest through the year 2030 (tables 7 and 8). The data from 1979 to 1982 are omitted from tables 5 and 6 because volumes are thought to be influenced heavily by the waferboard industry. Projections for timber used by the waferboard industry are made separately.

Harvest of sawtimber is projected to increase 52 percent on each forest. Softwoods will account for

Table 2.—*Projected pulpwood harvest on the Chippewa and Superior National Forests through 2030*

(In thousand cords)

Year	Northern Minnesota[1]			Chippewa National Forest			Superior National Forest		
	Softwoods	Aspen	Other hardwoods	Softwoods	Aspen	Other hardwoods	Softwoods	Aspen	Other hardwoods
1985	464	883	51	32.4	60	4.3	55.7	103	7.4
1990	475	990	69	33.3	69	4.8	57.0	119	8.3
2000	455	1,290	90	31.9	90	6.3	54.6	155	10.8
2010	342	1,516	106	23.9	106	7.4	41.0	182	12.7
2020	352	1,784	125	24.6	125	8.8	42.2	214	15.0
2030	263	2,115	148	18.4	148	10.3	31.5	254	17.8

[1]Rockel *et al.* (1983).

Table 3.—*Sawtimber harvest by species group on the Chippewa National Forest*[1]

(In thousand board feet, Scribner Decimal C)

Year	Softwoods		Aspen		Other Hardwoods		Total
	Volume	Percent of total	Volume	Percent of total	Volume	Percent of total	
1964	4,786	43	4,442	40	1,897	17	11,125
1965	6,213	60	2,656	26	1,423	14	10,292
1966	3,836	35	5,361	49	1,835	16	11,032
1967	6,108	52	3,786	32	1,794	16	11,688
1968	5,552	46	4,129	34	2,338	20	12,019
1969	3,495	39	4,522	50	1,008	11	9,025
1970	4,885	52	2,370	25	2,071	23	9,326
1971	4,291	60	1,596	22	1,219	18	7,106
1972	4,675	80	19	1	519	19	5,213
1973	4,221	68	1,051	17	933	15	6,205
1974	4,788	77	1,073	17	870	6	6,731
1975	3,816	78	470	10	619	12	4,905
1976	4,204	63	1,171	18	1,269	19	6,644
1977	4,186	79	140	3	944	18	5,270
1978	4,272	72	501	8	1,159	20	5,932
Mean		60		23		17	

[1]Data from unpublished records of timber cut and sold in Region 9 National Forests, Milwaukee, WI.

Table 4.—*Sawtimber harvest by species group on the Superior National Forest*[1]

(In thousand board feet, Scribner Decimal C)

Year	Softwoods		Aspen		Other Hardwoods		Total
	Volume	Percent	Volume	Percent	Volume	Percent	
1964	4,247	54	2,119	27	1,577	19	7,943
1965	5,708	69	1,054	13	1,470	18	8,232
1966	4,693	59	1,765	22	1,541	19	7,999
1967	7,639	74	1,442	14	1,283	12	10,364
1968	8,949	79	1,421	13	887	8	11,257
1969	7,557	74	1,839	18	765	8	10,161
1970	7,764	79	1,158	12	928	9	9,850
1971	4,244	60	2,090	29	758	11	7,092
1972	6,664	76	1,434	17	582	7	8,680
1973	4,933	56	2,922	33	954	11	8,809
1974	6,967	67	2,652	26	779	7	10,398
1975	4,277	77	1,007	18	290	5	5,574
1976	4,457	56	2,578	33	875	11	7,910
1977	3,099	72	971	23	215	5	4,285
1978	3,671	64	1,359	24	731	12	5,961
Mean		68		21		11	

[1]Data from unpublished records of timber cut and sold in Region 9 National Forests, Milwaukee, WI.

Table 5.—*Saw log harvest in the Northern Region and on the Chippewa and Supeiror National Forests*

(In thousand board feet, Scribner Decimal C)

	Northern Region[4]	Chippewa National Forest		Superior National Forest	
Year	Volume	Volume[2]	Regional percent	Volume	Regional percent
1970	7,082,000	9,326	13	9,850	14
1975	6,946,000	4,905	7	5,574	2
1976	6,294,000	6,644	11	7,910	13
1980	6,810,000	10,394	15	12,798	19
Mean			12		14

[1]1975 data from Rockel *et al.* (1983). Data for 1970, 1976, and 1980 from USDA (1982b).
[2]Data from unpublished records of timber cut and sold in Region 9 National Forests, Milwaukee, WI.

Table 6.—*Projected sawtimber harvest on the Chippewa and Superior National Forests*

(In million board feet, Scribner Decimal C)

Year	Northern Region[1]	Chippewa National Forest	Superior National Forest
1985	6,674	8.01	9.34
1990	6,545	7.85	9.16
2000	7,674	9.21	10.74
2010	8,784	10.54	12.30
2020	9,969	11.96	13.96
2030	10,908	13.09	15.27

[1]Projections from USDA (1982b).

Table 7.—*Projected sawtimber harvest on the Chippewa National Forest by species group*

(In million board feed, Scribner Decimal C)

Year	Total	Softwoods	Aspen	Other hardwoods
1985	8.01	4.81	1.84	1.36
1990	7.85	4.71	1.80	1.33
2000	9.21	5.52	2.12	1.56
2010	10.54	6.32	2.42	1.79
2020	11.96	7.18	2.75	2.03
2030	13.09	7.85	3.01	2.22

Table 8.—*Projected sawtimber harvest on the Superior National Forest by species group*

(In million board feed, Scribner Decimal C)

Year	Total	Softwoods	Aspen	Other hardwoods
1985	9.34	6.35	1.96	1.03
1990	9.16	6.23	1.92	1.01
2000	10.74	7.31	2.26	1.18
2010	12.30	8.36	2.58	1.35
2020	13.96	9.49	2.93	1.54
2030	15.27	10.38	3.21	1.68

more than half of the harvest in each case. Rockel *et al.* (1983) projected a 53 percent increase in sawtimber harvested from northern Minnesota with a larger increase in aspen sawtimber harvest. This difference is due to the separation of aspen use by the waferboard industry in this report.

HARVEST FOR THE WAFERBOARD INDUSTRY

The waferboard industry throughout the United States has grown at a remarkable rate. Northern Minnesota, because of its supply of aspen, has become the center of the industry. Four waferboard plants are operating in northern Minnesota and another is planned. Because the industry is young, projections could not be made on the basis of past history, as was done for other industries. So, consumption of National Forest aspen by the Minnesota waferboard industry was derived from projected use in construction.

First, we determined the amount of waferboard that would likely be used in building the average home in every 10th year from 1990 to 2030 (USDA 1982). The data used show a steady increase in the use of waferboard in house construction on the assumption that it will gradually replace plywood and other panel products (personal communication from R. Geimer, Forest Products Laboratory). The resulting figures were then multiplied by the predicted housing starts for those years (Marcin 1977) and adjusted upward by a factor (also derived from USDA (1982)) to account for waferboard use in other than housing construction.

Finally, we needed to determine the market area that would probably draw on the northern Minnesota timber supply. We expect the market area to be limited by high transportation costs. This will likely promote local waferboard plants where suitable forest resources are available. On this premise, we suggested two potential alternative markets—narrow and broad. We assumed a greater growth of the waferboard industry in the Midwest, South, and Rocky Mountains for the "narrow" market than for the "broad" market, and thus a narrower market for northern Minnesota wood. The narrow market then includes all housing starts in Minnesota and North and South Dakota, 30 percent of those in Iowa, and 10 percent of those in Wisconsin and Illinois. The broad market includes all starts in Minnesota and the Dakotas plus 60 percent of those in Iowa, 50 percent in Nebraska, and 30 percent in Wisconsin and Illinois.

Both these market areas may seem limited, considering the current location of waferboard plants in the United States. Recently, however, the waferboard industry has built plants in areas of the country where there was previously no waferboard production. These plants are generally smaller than earlier ones and utilize a variety of species. Given these changes in the industry, we assume that other sections of the north central region will begin producing waferboard and thus marketing of this product will become even more regional than it is now.

The volume of aspen harvested on the Chippewa and Superior National Forests for use by the northern Minnesota waferboard industry is then determined by converting waferboard quantities to cords (0.87 cord per thousand square feet of 3/8-inch waferboard), according to Harpole (1978), and multiplying by the market share for each forest (7 percent for the Chippewa and 12 percent for the Superior).

Assuming the "broad" market, the waferboard industry is projected to use 59,000 cords of aspen from the Chippewa National Forest and 101,000 cords from the Superior National Forest by 2030. If the "narrow" market area is assumed, the projected use of aspen would be 38,000 cords and 65,000 cords from the Chippewa and Superior National Forests, respectively (table 9).

Projections for aspen are divided into consumption of pulpwood and sawtimber and consumption by the waferboard industry. No attempt has been made to allocate the waferboard consumption by size class. Thus the pulpwood and sawtimber consumption projections for aspen may appear to be low.

FUELWOOD HARVESTS

Fuelwood harvest on the two National Forests in Minnesota has been minimal. USDA-Forest Service, Region 9, sale records indicate for the period 1971-1982 the Chippewa National Forest had an average annual cut of 228 cords from growing stock and the Superior only 5 cords. Most of this harvest was for residential use. Given the growth rate of fuelwood use per year projected by the Minnesota Department of Natural Resources (1981a), the largest anticipated annual harvest from growing stock would be 360 cords from the Chippewa National Forest and less than 50 cords from the Superior National Forest in 2030. Projected timber harvest for fuelwood use is not included in aggregate harvest from growing stock projections because it is less than 500 cords per year.

In 1982 and 1983, there were large increases in nonresidential fuelwood use, particularly by government institutions, a portion of which came from growing stock (Minnesota DNR 1983). Because this is a recent phenomenon, we do not have enough data to project the impact that nonresidential fuelwood

Table 9.—*Projected harvest of aspen from the Chippewa and Superior National Forests for use by the waferboard industry*

(In thousand cords)

Year	Northern Minnesota		Chippewa National Forest		Superior National Forest	
	Narrow market[1]	Broad market	Narrow market[2]	Broad market	Narrow market	Broad market
1990	16.7	26.5	1.2	1.9	2.0	3.2
2000	91.2	143.3	6.4	10.0	10.9	17.2
2010	296.6	467.0	20.8	32.7	35.6	56.0
2020	449.2	700.2	31.4	49.0	53.9	84.0
2030	544.6	844.6	38.0	59.1	65.4	101.3

[1]Narrow market: All housing starts in Minnesota, South Dakota, North Dakota; 0.3 of the housing starts in Iowa, and 0.1 of the housing starts in Wisconsin and Illinois.

[2]Broad market: All housing starts in Minnesota, South Dakota, North Dakota; 0.6 of the housing starts in Iowa; 0.5 of the housing starts in Nebraska; and 0.3 of the housing starts in Wisconsin and Illinois.

use may have upon harvests, particularly upon currently unused growing stock hardwood species.

However, we do know that the harvest of fuelwood is an important timber use in northern Minnesota, and so the vagaries of future demand could influence projected total harvests of timber.

OTHER POTENTIAL SOURCES OF DEMAND

An increase in demand for northern Minnesota timber for new products and industries is possible but of course not quantifiable. Expansion of the medium density fiberboard industry into northern Minnesota, for example, would increase the hardwood harvest on the Chippewa and Superior National Forests.

Press drying is another recent development that could increase the use of dense hardwoods in the paper industry. This process permits the use of hardwood pulp to make paper that has a higher compressive strength than is currently attainable, and gives the hardwood resource a new competitive economic advantage. However, because these and other new developments are still speculative we make no allowance for them in this report.

THE AGGREGATE PROJECTED TIMBER HARVEST ON THE CHIPPEWA AND SUPERIOR NATIONAL FORESTS

The projected harvest—assuming growth exceeds and thus does not restrict the harvest—is shown in tables 10 and 11 for the Chippewa and Superior National Forests. The harvest on the Chippewa National Forest is projected to grow 130 percent to 262,000 cords by 2030. Harvest on the Superior National Forest is projected to grow 133 percent to 435,000 cords. The timber resources in Minnesota are primarily on public land. Thus, existing and new industries must review timber resource statistics and future estimates as well as the intentions of public agencies to provide raw material necessary

Table 10.—*Projected harvest of timber grown on the Chippewa National Forest*

(In thousand cords)

Year	Aspen			Other hardwoods		Softwoods		Total
	Pulpwood	Sawtimber[1]	Waferboard	Pulpwood	Sawtimber	Pulpwood	Sawtimber	
1985	60	3.7	1.5	4.3	2.7	32.4	9.6	114.2
1990	69	3.6	1.9	4.8	2.6	33.3	9.4	124.6
2000	90	4.2	10.0	6.3	3.1	31.9	11.0	156.5
2010	106	4.8	32.7	7.4	3.7	23.9	12.6	191.1
2020	125	5.5	49.0	8.8	4.2	24.6	14.4	231.5
2030	148	6.0	59.1	10.3	4.5	18.4	15.8	262.1

[1]Conversion from table 7: 2.00 cords = MBF Scribner Decimal C log rule.

Table 11.—*Projected harvest of timber grown on the Superior National Forest*

(In thousand cords)

Year	Aspen			Other hardwoods		Softwoods		Total
	Pulpwood	Sawtimber[1]	Waferboard	Pulpwood	Sawtimber	Pulpwood	Sawtimber	
1985	103	4.0	1.9	7.4	2.1	55.7	12.7	186.8
1990	119	3.9	3.2	8.3	2.0	57.0	12.5	205.9
2000	155	4.5	17.2	10.8	2.4	54.6	14.7	259.2
2010	182	5.2	56.0	12.7	2.7	41.0	16.8	316.4
2020	214	5.8	84.0	15.0	3.1	42.2	19.1	383.2
2030	254	6.4	101.3	17.8	3.4	31.5	20.8	435.2

[1]Conversion from table 8: 2.00 cords = MBF Scribner Decimal C log rule.

for their capital investments. We assume that forest product industries will make rational decisions on how to best meet regional and national demand for forest products and that industrial capacity will not grow to exceed the supply of raw material.

Only on the Chippewa National Forest after 2020 does total projected harvest exceed projected growth (table 12). However, the projected harvest of aspen will exceed projected growth on both forests in the decade around the year 2000 (table 14). Harvests exceeding growth levels are entirely possible and rational due to the imbalance of age-class distributions and the over abundance of mature aspen. The projected growth of aspen was determined by multiplying the total projected growth on the Chippewa National Forest (table 12) by the aspen-birch type share of the total commercial forest area (table 14). Similarly, for the Superior National Forest, the projected growth (table 13) was multiplied by the aspen-birch type share. Current growth rates are similar for all species (Fuller 1979, Minnesota DNR 1981a), so we assume equal increases in growth for all species.

Future harvests are lower when we assume that the total projected harvest cannot exceed total projected growth for any year. On the Chippewa National Forest, timber harvested would increase 41 percent from 114,000 cords in 1985 to 161,000 cords in 2030. On the Superior National Forest, the increase would be 64 percent from 187,000 cords to 307,000 cords.

There are other methods of projecting harvest. Erkkila *et al.* (1982) and the Minnesota Department of Natural Resources (1981a) make projections for larger geographical regions that contain the Chippewa and Superior National Forests. These reports show future harvests similar to our projections.

CONCLUSIONS

We recognize that forecasting is tempered by future events that cannot be predicted with certainty. Our projections of future harvests were based on some reasonable assumptions such as population trends, timber growth, and future timber use. Under all assumptions, total timber harvest on both forests was projected to increase substantially by 2030.

The increasing demand for aspen may adversely affect total future harvest unless other species can be substituted for waferboard and other products. This implies that both forests should give high priority to the management of aspen. Forest product industries should also consider ways of substituting other species for aspen.

Table 12.—*Projected annual growth vs. projected total harvest on the Chippewa National Forest*

Year	Area	Growth	Growth	Unconstrained total harvest
	Thousand acres[1]	*Cords/acre*[2]	*Thousand cords*	
1985	562	.33	185	114
1990	574	.34	195	125
2000	574	.36	207	157
2010	574	.38	218	191
2020	574	.40	230	232
2030	574	.42	241	262

[1]Apportioned from projections in Wall (1981).
[2]Minnesota DNR (1981b).

Table 13.—*Projected annual growth vs. projected total harvest on the Superior National Forest*

Year	Area	Growth	Growth	Unconstrained total harvest
	Thousand acres[1]	*Cords/acre*[2]	*Thousand cords*	
1985	1,152	.33	380	187
1990	1,176	.34	400	206
2000	1,176	.36	423	259
2010	1,176	.38	447	316
2020	1,176	.40	470	383
2030	1,176	.42	494	435

[1]Apportioned from projections in Wall (1981).
[2]Minnesota DNR (1981b).

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Table 14.—*Projected growth of aspen, projected unconstrained harvest of aspen, and projected total harvest with species growth as a limiting constraint on the Chippewa and Superior National Forests*

(In thousand cords)

	Chippewa National Forest			Superior National Forest		
Year	Aspen growth	Unconstrained aspen harvest	Constrained total harvest	Aspen growth	Uncontrained aspen harvest	Constrained total harvest
1985	85	65	114	179	109	187
1990	65	75	125	188	126	206
2000	95	105	148	199	177	259
2010	100	144	148	210	244	284
2020	106	180	159	221	304	302
2030	111	214	161	232	362	307

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Future timber harvests on the Chippewa and Superior National Forests in Minnesota. Resour. Bull. NC-89. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1985. 11 p.

Timber harvests on the Superior and Chippewa National Forests in Minnesota are projected to increase substantially by 2030. The increasing demand for aspen may affect the total harvest. Both forests need to give high priority to aspen management.

KEY WORDS: Pulpwood, saw logs, fuelwood, forecasting, consumption.

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Wisconsin Timber Industry—An Assessment of Timber Output Trends

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FOREWARD

This Bulletin discusses recent Wisconsin forest industry trends and contains the results of a detailed study of forest industry, roundwood production, and associated primary mill wood and bark residue in Wisconsin in 1981. Such detailed information is necessary for intelligent planning and decisionmaking in wood procurement, forest resource management, and forest industry development. Likewise, researchers need current forest industry and roundwood information for planning projects.

Special thanks are given to the primary wood-using firms, households, and loggers that supplied information for this study and to the Wisconsin Department of Natural Resources foresters who canvassed these respondents. Their cooperation is greatly appreciated.

Quantities shown may vary slightly from one table to another because of rounding differences, but these differences are insignificant.

The last detailed study of all roundwood product output was in 1967; the last detailed study of all roundwood product output, except fuelwood and commercial posts, was in 1973. Most comparisons in this report are with the 1967 and 1973 study results.

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WISCONSIN TIMBER INDUSTRY—AN ASSESSMENT OF TIMBER OUTPUT TRENDS

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HIGHLIGHTS

- Wisconsin primary wood-using mills (excluding treating plants) imported 19 percent of their roundwood requirements in 1981.
- Roundwood production climbed to 395.3 million cubic feet in 1981 from 181.3 million cubic feet in 1967.
- Roundwood production in 1981 was at least 68 percent higher in each Survey Unit than in 1967.
- Fuelwood accounted for one-third of the roundwood harvest compared to one-eighth of the harvest in 1967.
- Aspen, red oak, and elm, the leading species cut, furnished 54 percent of the total harvest.
- Three-fourths (79 percent) of the roundwood cut came from private land.
- Wisconsin produced a record high 2.39 million cords of pulpwood in 1981. This record was broken in 1983 when production was 2.47 million cords based on the North Central Station's annual study of pulpwood production.
- Wisconsin pulpmills procured 26 percent of their wood requirements from out-of-State, down from 38 percent in 1973.
- Saw log production rose from 273 million board feet in 1967 to 387 million board feet in 1973 to 491 million board feet in 1981.
- Principal saw log species were red oak, aspen, hard maple, elm, white pine, and white oak.
- Average lumber output per sawmill rose 13 percent between 1973 and 1981.
- Wisconsin cut 7 percent (27.3 million board feet) of the U.S. hardwood veneer-log harvest.
- Central and Southeast Wisconsin supplied one-half of the 1,916,000 cords of fuelwood cut from roundwood. Another 250,000 cords were primary wood-using mill residue from throughout the State.
- More than half (52 percent) of the roundwood fuel was red oak and elm.
- Rural woodland supplied 78 out of every 100 cords of roundwood fuel.
- Logging residue generated in 1981 was estimated to be the equivalent of 1,353,000 cords of pulpwood, enough to supply five, 500-ton/day pulpmills for 1 year.
- Ninety-six percent or more of each residue class (coarse, fine, bark) generated at Wisconsin primary mills was used.

PRIMARY FOREST INDUSTRY—ROUNDWOOD PRODUCTION

On a volume of wood-used basis, pulpmills dominate Wisconsin forest industry; but sawmills far outnumber any other mill category. Of 663 primary mills operating in 1981, 613 were sawmills. The total active (operating) mill population rose from 583 in 1973 but declined from 898 in 1967. Sawmills accounted for all of the active mill increases since 1973 and all mill sizes (small, medium, and large) participated in the gains. However, the major numerical increase was in small sawmills cutting less than 1 million board feet annually. The rise in the population of small sawmills reversed a two-decade decline in that size class but may prove to be a temporary reversal. The increase in the number of

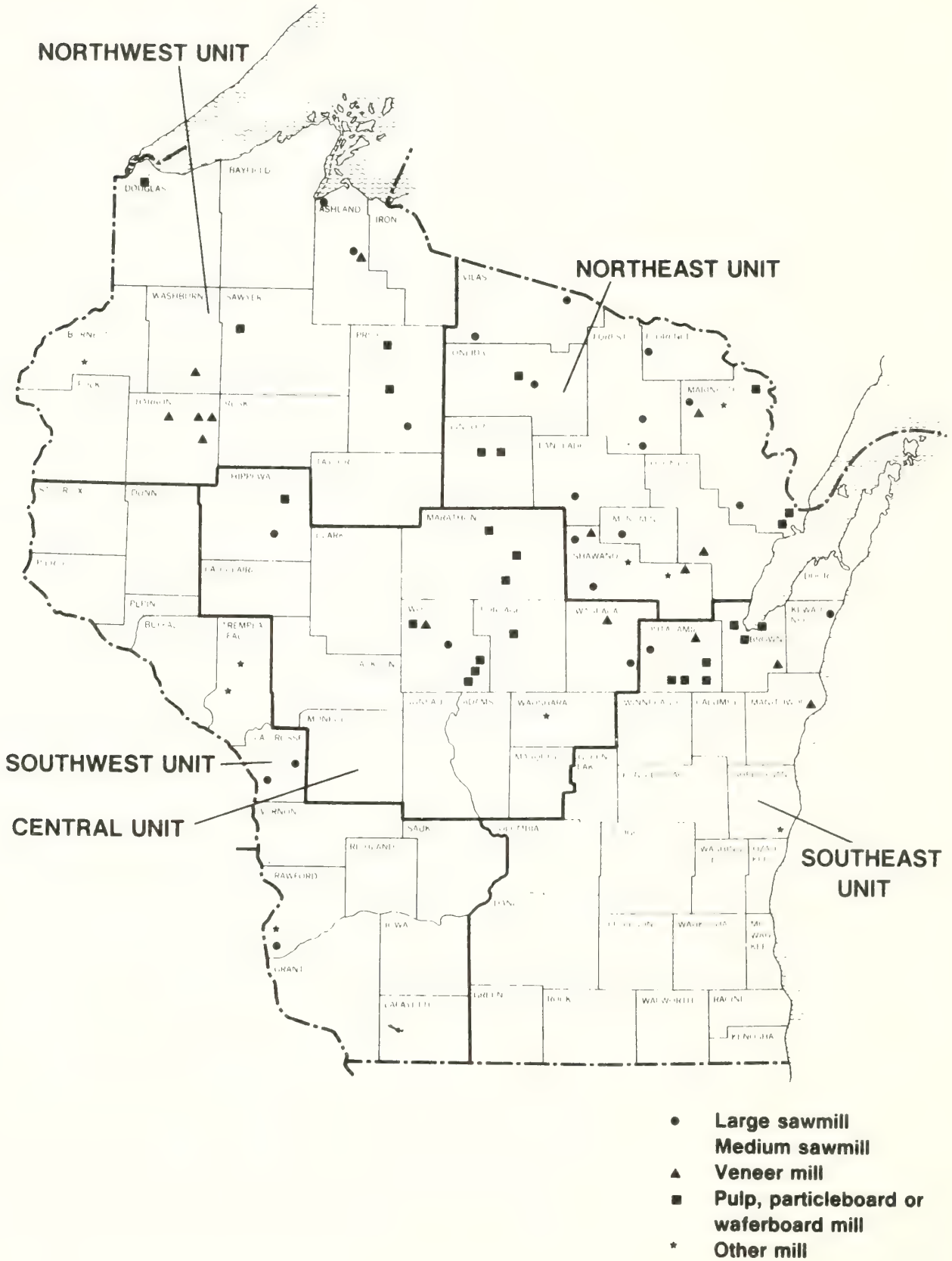
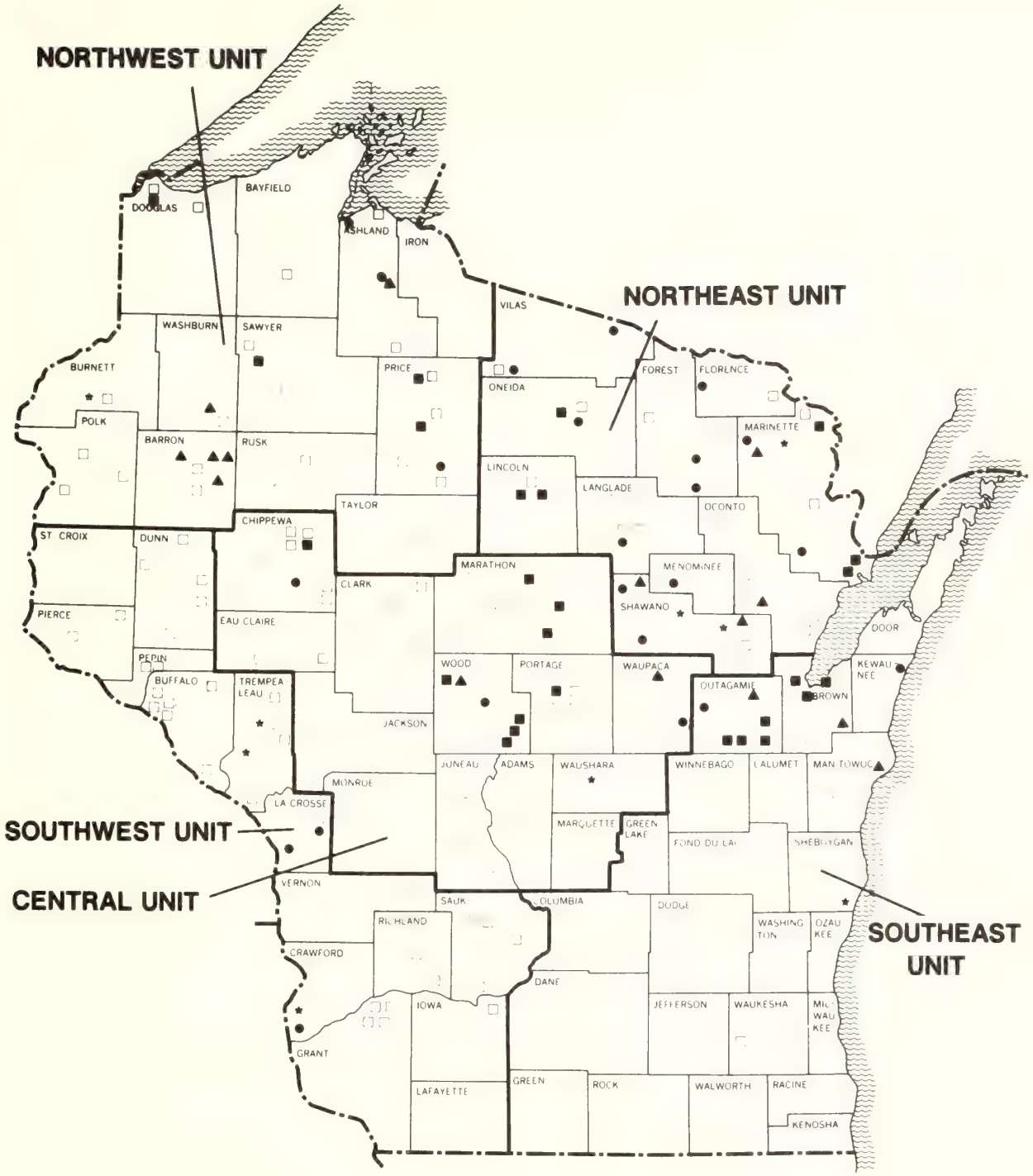


Figure 1.—*Active primary wood-using mills and Forest Survey Units in Wisconsin, 1981. Sawmills are classed by volume of lumber produced in 1981: large = 5 million board feet or more; medium = 1 to 4.999 million board feet (smaller sawmills not shown). Forest Survey Units are the geographic areas used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nation's forest resources.*



This replaces Figure 1 on page 2.

Figure 1.—*Active primary wood-using mills and Forest Survey Units in Wisconsin, 1981. Sawmills are classed by volume of lumber produced in 1981: large = 5 million board feet or more; medium = 1 to 4.999 million board feet (smaller sawmills not shown). Forest Survey Units are the geographic areas used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nation's forest resources.*

active large and medium sawmills continued a trend begun in 1956.

Since at least 1956, the annual quantity of logs and bolts used per mill has increased. Most mills constructed since 1956 have been larger than average for their mill type, and most mills that closed were small and inefficient. Although the industry is dispersed throughout the State, major mills are concentrated in the northern, central, and east-central areas (fig. 1).

Log and bolt receipts at active mills were 309.7 million cubic feet, up 19 percent from 1973 and 21 percent from 1967. These receipts represent 2.6 percent of the roundwood consumed at U.S. mills in 1981. Three-fourths of the receipts were hardwoods. Wisconsin mills (excluding treating plants) imported 19 percent of their roundwood requirements, down from 25 percent in 1973. Compared to the previous 4 or 5 years, national markets for saw logs and veneer logs were weak in 1981, but markets for pulpwood were moderately strong.

Roundwood production climbed from 181.4 million cubic feet in 1967 to 395.3 million cubic feet in 1981. Annual production increases averaged 6.2 percent for softwoods and 5.2 percent for hardwoods. Roundwood output more than quadrupled in the Southeast Unit and rose significantly in the other Units:

Survey Unit	Roundwood production 1967	1981	Change
	Million (Thousand cubic feet)		(Percent)
Northeast	71.3	119.5	+68
Northwest	51.1	110.4	+116
Central	33.3	77.4	+132
Southwest	16.9	49.9	+195
Southeast	8.8	38.1	+333
Total	181.4	395.3	+118

Most of the major production gains between 1967 and 1981 were in fuelwood in the Central and Southern Units and in pulpwood and fuelwood in the Northern Units. Roundwood products Statewide in 1981 and 1967 ranked in order of output were:

Product	Roundwood production 1967	1981
	(Percent)	
Pulpwood	58.0	41.9
Fuelwood	24.9	33.9
Saw logs	12.1	21.8
Veneer logs	2.0	1.1
Posts	1.2	1.1
Other	1.8	0.2

Proportionally, roundwood production partially shifted from northeast to southern Wisconsin between 1967 and 1981. Huge increases in fuelwood harvesting in the Southern Units accounted for the bulk of this shift.

Aspen, red oak, and elm, the leading species cut, provided 54 percent of the total Statewide harvest in 1981. Harvesting of each major species increased by 41 percent or more from 1967:

Species	Roundwood Production 1967	1981	Change
	Million (Thousand cubic feet)		(Percent)
Aspen	70.4	99.6	+41
Red oak	26.1	65.8	+152
Elm	10.2	47.0	+361
Hard maple	13.6	30.0	+121
White oak	5.9	20.2	+242
Red pine	1.6	19.5	+1,119
Jack pine	13.3	19.0	+43
Paper birch	6.3	18.9	+200
Soft maple	5.6	14.5	+159
Ash	4.1	9.9	+141
Balsam fir	3.8	9.6	+153
White pine	3.9	8.8	+126
Basswood	4.5	8.2	+82
Other species	12.1	24.3	+101
Total	181.4	395.3	+118

Largest percentage gains since 1967 were in red pine and elm. Red pine plantations are maturing and being thinned for products and elm dying from Dutch elm disease are being salvaged.

Nearly four-fifths of the roundwood harvest came from private land:

Owner	Roundwood harvest All species	Softwoods	Hardwoods
	(Percent)		
National Forest	5	10	4
Other federal	(1)	(1)	(1)
State	2	3	1
County and municipal	12	12	12
Indian	2	5	2
Private			
Forest industry	8	15	7
Other private	71	55	74
Total	100	100	100

Public land supplied a higher proportion of softwoods than hardwoods because most of the public land is in northern Wisconsin where softwoods are more prevalent.

PULPWOOD

In 1981 Wisconsin produced 2.39 million cords of pulpwood which was a record high at that time. Eighty-eight out of 100 cords were roundwood; the remainder was wood residue from sawmills, veneer

[1]*Less than 1 percent.*

mills, and other mills. Residue has become an important pulpwood source since 1959 and has contributed more than 200,000 cords annually since 1978.

In 1951, hardwood constituted more than half of the roundwood cut. Since then, the hardwood proportion of roundwood has grown to about three-fourths of the total.

Annual harvests of aspen, the leading pulpwood species, have more than quadrupled in the last 30 years. Harvesting of other hardwoods began after World War II and, by the early 1950's, became an important part of the pulpwood cut. During the last decade the annual birch harvest has doubled. Important hardwood species cut for pulpwood in 1981 were:

Species	Hardwood pulpwood (Thousand cords)
Aspen	965
Paper birch	131
Hard maple	119
Elm	71
Soft maple	63
Red oak	61

Pine has been the leading softwood pulping species cut for more than 35 years. Since 1975 the annual pine cut has exceeded 250,000 cords and rose above 400,000 cords in 1981. Composition of the 1981 pine cut was jack pine (52 percent), red pine (43 percent), and white pine (5 percent). Since 1971 the annual balsam fir harvest has nearly doubled; the hemlock, spruce, and tamarack harvests have not shown any definite trends.

Most (97 percent in 1981) of Wisconsin's pulpwood remains in the State. Minnesota and Michigan are the principal customers for pulpwood leaving Wisconsin.

Northeast and Northwest Wisconsin supplied 83 percent of the roundwood pulpwood. Counties furnishing more than 100,000 cords each were Marinette, Oneida, Bayfield, Forest, Douglas, Sawyer, and Price.

Twenty-six Wisconsin mills (23 pulp, 2 particleboard, and 1 waferboard) received 3.15 million cords of pulpwood in 1981. Imports included 419,000 cords from Michigan, 177,000 cords from Minnesota, 164,000 cords from other (primarily western) States, and 75,000 cords from Canada. Roundwood constituted 84 percent of the total receipts. Leading imported species were aspen, spruce, jack pine, and hard maple. Canadian shipments were spruce and softwood residue. Sawmills in several western States were the chief suppliers of softwood residue chips to Wisconsin.

Since 1946 the upward trend in receipts has been interrupted periodically by several sharp declines. These declines are usually a reaction to overbuilding woodyard inventories at mills.

Demand in Wisconsin for birch has increased significantly since 1973 while demand for aspen and other hardwoods has leveled off. During the last decade demand for pine rose slightly, demand for balsam fir and tamarack was steady, and demand for spruce and hemlock fell sharply. Pine overtook spruce in 1959 as the primary softwood species used in Wisconsin. Spruce imports from Minnesota have fallen irregularly since 1967 and have plunged from Canada since 1973.

SAW LOGS

During 1981 loggers in Wisconsin harvested 491 million board feet of saw logs, which is up 104 million board feet from 1973 and up 218 million board feet from 1967. Eighty-five percent was hardwoods. Wisconsin saw log output was excellent considering the nation's saw log production in 1981 was the lowest in more than 30 years. Principal species cut were:

Species	Saw log production volume (Million board feet, Int'l. 1/4-inch rule)
Red oak	133
Aspen	76
Hard maple	47
Elm	43
White pine	37
White oak	34

Only 1 million board feet were shipped out-of-State.

Major production gains since 1973 were in red oak (48 million board feet), white oak (15 million board feet), and white pine (13 million board feet). Red oak is in high demand for furniture. More than four-fifths of the gain in the red oak cut came from Central and Southeast Wisconsin.

Elm production dropped 15 million board feet from 1973; no other species had a decline of more than 1 million board feet. Elm saw log production changes since 1973 reflect the decimation of elm by Dutch elm disease in the Southeast Unit and the spread of the disease in the Northwest Unit:

Survey Unit	Elm saw log production	
	1973	1981
	(Thousand board feet, Int'l 1/4-inch rule)	
Northeast	27,904	20,240
Northwest	3,510	13,130
Central	14,548	4,481
Southwest	4,607	3,981
Southeast	7,495	1,008

Compared to 1973, loggers intensified their saw log harvesting in the Northwest, Central, and

Southwest Units. Northeast Wisconsin supplied 30 percent of the saw log volume including 48 percent of the aspen and hard maple, 47 percent of the elm, and 37 percent of the white pine.

Leading saw log-producing counties were Forest, Marinette, Menominee, and Price. Nineteen counties each cut more than 12 million board feet.

More than 600 sawmills received 539 million board feet of saw logs in 1981 compared with 408 million board feet received by more than 500 mills in 1973. Imports came chiefly from Michigan (39 million board feet) and Minnesota (9 million board feet).

Average lumber output per sawmill rose 13 percent from 1973 to 1981. Output continues to rise because most mills that close are smaller than average, most new mills are larger than average, and other mills improved their productivity. Northeast Wisconsin, containing 12 of the 23 largest mills, was the leading lumber-producing Unit.

VENEER LOGS

Wisconsin cut 7 percent of the U.S. hardwood veneer log harvest in 1981. Of the 27.2 million board feet of veneer logs cut in 1981 in Wisconsin, 52 percent remained in the State, 45 percent was shipped to Michigan, and most of the remainder was sent to Indiana and to other countries. Aspen was the primary species cut, followed by red oak, hard maple, and elm. Top-producing counties were Iron, Bayfield, Shawano, La Crosse, Douglas, and Vilas.

Veneer log production fell 5 million board feet from the 1973 level. Declines were concentrated in elm, hard maple, red oak, and walnut. Walnut harvest was nominal in 1981.

In 1981, 15 Wisconsin veneer mills received 34.5 million board feet of logs, which is down 3.3 million board feet from 1973. Elm receipts dropped 74 percent from 1973. Nearly three-fifths of the volume came from out-of-State—Michigan (14.1 million board feet), Minnesota (2.5 million board feet), Iowa (1.3 million board feet), Illinois, Pennsylvania, Indiana, and Canada. Principal species imported and their major sources were hard maple and yellow birch from Michigan and red oak from Minnesota, Iowa, and Michigan.

During the last 35 years in Wisconsin, the number of active veneer mills dropped by about two-thirds and the annual volume of veneer logs consumed fell by half. Most of the decline in veneer log receipts occurred between 1956 and 1970. Since 1970, annual veneer log consumption has ranged between 28 and 42 million board feet. Michigan has been a critical supplier of veneer logs to Wisconsin for more than 3 decades.

FUELWOOD

Fuelwood production in 1981 was 2,166,000 cords; 1,916,000 cords were from roundwood and 250,000 cords were from primary wood-using mill residue used for industrial and domestic fuel.

Central and Southeast Wisconsin supplied one-half of the roundwood fuel. No Survey Unit contributed less than 14 percent. Counties each producing more than 50,000 cords were Marathon, Outagamie, Oneida, Sheboygan, Grant, Eau Claire, and Chippewa.

Households cut 7 out of 8 cords of fuelwood from roundwood; loggers cut the remainder. However, loggers harvested 1 out of 4 cords in the two Northern Units:

Survey Unit	Fuelwood production		
	Households	Loggers	Totals
	(Thousand cords)		
Northeast	241	79	320
Northwest	204	66	270
Central	411	82	493
Southwest	355	10	365
Southeast	465	3	468
Total	1,676	240	1,916

Red oak and elm comprised 52 percent of the roundwood fuel. Leading species cut were:

Species	Roundwood fuel production	
	(Thousand cords)	(Percent)
Red oak	526	27
Elm	479	25
Hard maple	179	9
White oak	176	9
Aspen	103	5
White birch	98	5
Soft maple	85	4
Ash	69	4

No other species supplied more than 26,000 cords. Only 3 percent was softwoods; white, jack, and red pine were the major softwoods.

Most (92 percent) of the fuelwood cut came from private land. A significant quantity of fuelwood in the Northern Units came from public land:

Survey Unit	Fuelwood	
	Private	Public
	(Thousand cords)	
Northeast	264	56
Northwest	200	70
Central	470	23
Southwest	362	3
Southeast	465	3
Total	1,761	155

Rural woodland furnished 78 out of every 100 cords of roundwood fuel. Of the remaining 22 cords out of 100 that were cut from other land classes, 9 cords came from fence rows, windbreaks, and rural yards; 7 cords came from pasture and cropland; 5 cords came from cities and villages, and 1 cord came from other areas.

Most (85 percent) of the primary wood-using mill residue used for fuel was hardwood. Northeast Wisconsin was the leading supplier of both softwood and hardwood:

Survey Unit	Mill residue	
	Softwood	Hardwood
	(Thousand cords)	
Northeast	21	67
Northwest	8	44
Central	6	38
Southwest	3	53
Southeast	1	9
Total	39	211

Nearly 62 percent of the residue burned was coarse (chippable) and the remainder was fines (primarily sawdust, shavings, and veneer clippings).

Two residue user groups were identified—industrial and domestic. Industrial customers used about three-fifths (152,000 cords) of the residue burned for fuel; 88,000 cords were fines and 64,000 cords were coarse residue. Domestic (household) users preferred coarse residue because it is easier to handle and burns better than fines in most stoves and fireplaces. Domestic customers used 98,000 cords, only 7,000 cords of which were fines.

More detailed information on 1981 fuelwood production and sources in Wisconsin can be found in Resource Bulletin NC-75.

OTHER PRODUCTS

Other roundwood products (1.3 percent of all roundwood) cut in Wisconsin in 1981 included posts, shavings bolts, poles, cooperage logs, charcoal bolts, and piling. In order of importance, major species harvested were red pine, cedar, and aspen. Southwest and Northwest Wisconsin are the chief logging areas for these products.

LOGGING RESIDUE

During the 1981 roundwood harvest, an estimated 106.9 million cubic feet of logging residue was generated. Logging residue includes all wood fiber left behind from trees cut during logging operations and not subsequently used. Total residue generated is equivalent to 1,353,000 cords of pulpwood, enough wood to supply five, 500 ton/day pulpmills for 1 year. Alternatively, this volume of residue is equivalent to four-fifths of Wisconsin's fuelwood demand from roundwood in 1981.

Five species accounted for two-thirds of the residue:

Species	Residue volume	
	(Million cubic feet)	(Percent of total)
Aspen	39.0	36
Red oak	15.1	14
Hard maple	7.7	7
Elm	6.5	6
Jack pine	5.4	5

Seventeen of the 22 counties in the Northern Units each generated more than 1 million cubic feet of aspen residue.

The Northern Units produced 71 percent of the residue:

Survey Unit	Residue volume	
	(Million cubic feet)	(Percent of total)
Northeast	39.3	37
Northwest	35.9	34
Central	17.6	16
Southwest	11.7	11
Southeast	2.4	2
Total	106.9	100

Five counties—Marinette, Forest, Oneida, Bayfield, and Price—each produced more than 5 million cubic feet of logging residue.

PRIMARY MILL RESIDUE

During 1981, Wisconsin primary wood-using mills (except the pulpmills) generated 750,000 green tons of coarse residue, 465,000 green tons of fine residue, and 327,000 green tons of bark. Much of this residue was used: 99 percent of the coarse, 97 percent of the fine, and 96 percent of the bark residue was used. Pulpmills consumed 53 percent of the coarse residue for fiber products and industry and households consumed 40 percent for fuel. Fine residue was used primarily for industrial fuel, soil conditioners, mulch, livestock bedding, and poultry litter. Bark was used chiefly for industrial fuel.

Mills have found many additional markets for residue since 1973. In 1973, only 87 percent of the coarse residue, 70 percent of the fine, and 55 percent of the bark was used. Most of the increased use by 1981 was for fuel:

Residue type	Residue used for fuel	
	1973	1981
	(Percent)	
Coarse	18	40
Fine	21	40
Bark	37	78

Counties each producing more than 50,000 green tons of coarse and fine residue in 1981 were Vilas, Ashland, Marinette, Shawano, La Crosse, and Chippewa. Estimates of residue in 1981 by type of disposal for each county are found in the Appendix. Individuals or firms desiring residue can use the county data to pinpoint areas with the highest residue concentrations.

OUTLOOK

Growth rates in the U.S. economy, and particularly the economy of the Upper Midwest, will be major factors in determining the growth rate in demand for Wisconsin's roundwood products. Changes in demand for housing, furniture, pallets, railroad ties, paper, and paperboard are all vitally important to Wisconsin's primary wood-using industry.

Between 1967 and 1981 the average annual increases in roundwood production for pulpwood, saw logs, and fuelwood were:

Product	Average annual increase	
	Softwood	Hardwood
	(Percent)	
Pulpwood	5.4	2.6
Saw logs	7.6	4.3
Fuelwood	16.8	13.7

As mentioned earlier, the average annual increase for all roundwood products between 1967 and 1981 was 6.2 percent for softwoods and 5.2 percent for hardwoods. Neither of these rates of increase are likely to be sustained from 1981 to 1991; they were abnormally high because fuelwood demand increased at unsustainable rates since 1973. During the next decade, average annual rate increases are likely to: be lower for softwood pulpwood and remain steady for hardwood pulpwood; be lower for softwood and hardwood saw logs; and be 5 percent or less for softwood and hardwood fuelwood. Most of the reaction to higher energy prices was already reflected in the fuelwood harvest in 1981.

Through 1991, Wisconsin should continue to import significant quantities of roundwood and average output per mill should continue to rise.

APPENDIX

STUDY METHODS

Except for data on posts and fuelwood cut from roundwood, data for this publication came from canvassing (with formal questionnaires) all of the primary wood-using mills that use Wisconsin logs and bolts and all public agencies administering forest land. The study was a cooperative effort between the Wisconsin Department of Natural Resources (DNR) and the North Central Forest Experiment Station (NCFES). DNR foresters personally canvassed all of the Wisconsin primary mills (except pulp, particleboard, and waferboard mills) and public agencies (except Federal) administering Wisconsin forest land. DNR utilization and marketing specialists provided estimates based on prior knowledge and contacts for a few Wisconsin mills that did not furnish complete data.

The NCFES mailed formal questionnaires to all Wisconsin pulp, particleboard, and waferboard mills; all out-of-State mills using Wisconsin roundwood; federal agencies administering forest land; and all primary wood-using firms owning Wisconsin forest land.

Using formal questionnaires, DNR foresters canvassed by telephone 2,215 sample households and 248 sample loggers to obtain fuelwood and post data. Details concerning study methods are found in Resource Bulletin NC-75.

Logging utilization factors were used to estimate the logging residue. These factors were determined from a Wisconsin logging utilization study by the NCFES during 1981 and 1982.

The NCFES edited and compiled the data.

SAMPLING ERROR

Because all primary wood-using mills were canvassed, there is no sampling error for the roundwood products they used or the wood and bark residue they generated.

All the reported figures for fuelwood and posts are estimates based on sampling procedures designed to give accurate estimates of fuelwood production. A measure of reliability of these figures is given by sampling errors. The sampling error means that the chances are two out of three that the results for the sample differ by no more than the amount indicated from the results that would have been obtained if a 100 percent sample of all households and loggers had been made. Sampling error for fuelwood production was ±6.59 percent on a volume of 1,915,979 cords. Sampling error for post production was ±28.26 percent on a volume of 4,271,000 posts.

DEFINITION OF TERMS

Coarse mill residue.—Wood residue suitable for chipping such as slabs, edgings, and veneer cores.

Commercial forest land.—Forest land producing or capable of producing crops of industrial wood and not withdrawn from timber utilization by statute or administrative regulation. Generally, this includes areas suitable for growing crops of industrial wood in excess of 20 cubic feet per acre annually.

Consumption.—The quantity of a commodity, such as pulpwood, utilized.

County and municipal land.—Land owned by counties and local public agencies or municipalities, or land leased to these governmental units for 50 years or more.

Fine mill residue.—Wood residue not suitable for chipping such as sawdust and veneer clippings.

Forest industry land.—Land owned by companies or individuals operating primary wood-using plants.

Forest Survey Unit.—A geographical area (group of counties) used by the Forest Inventory and Analysis Project to report periodic inventories and use of the Nation's forest resources.

Indian land.—Tribal land held in fee but administered by the Federal Government.

Logging residue.—The unused portions of trees cut or killed by logging.

National Forest land.—Federal land that has been legally designated as National Forest or purchase units, and other land under the administration of the USDA Forest Service.

Primary wood-using mills.—Mills receiving roundwood or chips from roundwood for processing into products.

Primary wood-using mill residue.—Wood materials (coarse and fine) and bark generated at manufacturing plants from roundwood processed into principal products. These residues include wood products (byproducts) obtained incidental to production of principal products and wood materials not utilized for some product.

Roundwood.—Logs, bolts, or other round sections cut from trees (including chips from roundwood).

Roundwood production.—The quantity of roundwood harvested in a geographic area.

Roundwood products.—Saw logs, pulpwood, veneer logs, fuelwood, posts, cooperage logs, poles, piling, shaving bolts, charcoal bolts, and chips from roundwood.

Roundwood receipts.—The quantity of roundwood received in a geographic area regardless of the geographic source.

Rural woodland.—Wooded areas outside city and village limits excluding fence rows, windbreaks, rural yards, pasture, and cropland.

Standard cord.—A stack of wood bolts (or the equivalent) encompassing 128 cubic feet of wood, bark, and air space. A cord of pulpwood contains 79 cubic feet of wood and 49 cubic feet of bark and air space. A cord of fuelwood contains 70 cubic feet of wood and 58 cubic feet of bark and air space.

State land.—Land owned by States or land leased to these governmental units for 50 years or more.

COMMON AND SCIENTIFIC NAMES OF TREE SPECIES MENTIONED

SOFTWOODS

- Jack pine ..... *Pinus banksiana*
- Red pine ..... *Pinus resinosa*
- Eastern white pine ..... *Pinus strobus*
- White spruce ..... *Picea glauca*
- Black spruce ..... *Picea mariana*
- Balsam fir ..... *Abies balsamea*
- Eastern hemlock ..... *Tsuga canadensis*
- Tamarack ..... *Larix laricina*
- Northern white-cedar ..... *Thuja occidentalis*

HARDWOODS

- White oaks
  - White oak ..... *Quercus alba*
  - Swamp white oak ..... *Quercus bicolor*
  - Bur oak ..... *Quercus macrocarpa*
  - Chinkapin oak ..... *Quercus muehlenbergii*
- Red oaks
  - Northern red oak ..... *Quercus rubra*
  - Northern pin oak ..... *Quercus ellipsoidalis*
  - Black oak ..... *Quercus velutina*
- Hickory
  - Shagbark hickory ..... *Carya ovata*
  - Bitternut hickory ..... *Carya cordiformis*
- Yellow birch ..... *Betula alleghaniensis*
- Hard maple
  - Sugar maple ..... *Acer saccharum*
  - Black maple ..... *Acer nigrum*
- Soft maples
  - Red maple ..... *Acer rubrum*
  - Silver maple ..... *Acer saccharinum*
- Ashes
  - White ash ..... *Fraxinus americana*
  - Black ash ..... *Fraxinus nigra*
  - Green ash ..... *Fraxinus pennsylvanica*
- Balsam poplar ..... *Populus balsamifera*
- Eastern cottonwood ..... *Populus deltoides*
- Aspens
  - Bigtooth aspen ..... *Populus grandidentata*
  - Quaking aspen ..... *Populus tremuloides*
- American basswood ..... *Tilia americana*
- Beech ..... *Fagus grandifolia*
- Black walnut ..... *Juglans nigra*
- Elms
  - American elm ..... *Ulmus americana*
  - Slippery elm ..... *Ulmus rubra*
  - Rock elm ..... *Ulmus thomasii*

Paper birch ..... *Betula papyrifera*
Other hardwoods
Boxelder ..... *Acer negundo*
Black locust ..... *Robinia pseudoacacia*
Honeylocust ..... *Gladitsia triacanthos*
River birch ..... *Betula nigra*
Red mulberry ..... *Morus rubra*
Blackgum ..... *Nyssa silvatica*
Northern Catalpa ..... *Catalpa speciosa*
Sycamore ..... *Platanus occidentalis*
Black cherry ..... *Prunus serotina*
Butternut ..... *Juglans cinerea*
Hackberry ..... *Celtis occidentalis*
Black willow ..... *Salix nigra*

TABLE TITLES

Table 1. — Output of roundwood products by species group in Wisconsin, 1967 and 1981

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Table 28.— Residue produced at primary wood-using mills by type of material, type of use, and county, Wisconsin, 1981

Table 1.--Output of roundwood products by species group, Wisconsin, 1967 and 1981

(In million cubic feet)

Product	All species		Softwoods		Hardwoods	
	1967	1981	1967	1981	1967	1981
Pulpwood[1]	105.3	165.6	22.1	46.1	83.2	119.5
Saw logs	45.1	86.0	4.8	13.4	40.3	72.6
Fuelwood	21.9	134.0	0.4	3.5	21.5	130.5
Veneer logs	3.7	4.4	[2]	[2]	3.7	4.4
Posts	2.2	4.4	1.0	3.5	1.2	0.9
Cooperage logs	0.2	0.1	--	--	0.2	0.1
Poles & piling	0.5	0.1	0.4	0.1	0.1	[2]
Other[3]	2.5	0.7	--	--	2.5	0.7
All products	181.4	395.3	28.7	66.6	152.7	328.7

[1] Includes particleboard and waferboard bolts.

[2] Less than 50 thousand cubic feet.

[3] Includes logs and bolts used for excelsior, shavings, charcoal, and other specialty products.

Table 2.--Output of roundwood products by type of product, Wisconsin, 1981

Product	Standard units	All species	Soft-woods	Aspen	Other hard-woods	All species	Soft-woods	Aspen	Other hard-woods
		- - - Thousand standard units - - -				- - - - Thousand cubic feet - - - -			
Pulpwood[1]	Standard cords[2]	2,098	585	965	548	165,648	46,161	76,238	43,249
Saw logs	Board feet[3]	490,775	75,683	76,407	338,685	85,994	13,450	13,331	59,213
Fuelwood	Standard cords[2]	1,916	49	104	1,763	133,957	3,443	7,238	123,276
Veneer logs	Board feet[3]	27,250	44	12,971	14,235	4,389	5	2,109	2,275
Posts	Pieces	4,271	3,350	151	770	4,361	3,441	152	768
Cooperage logs	Board feet[3]	898	--	--	898	120	--	--	120
Poles	Pieces	17	16	--	1	142	140	--	2
Other[3]	Cubic feet	725	1	483	241	725	1	483	241
All products		--	--	--	--	395,336	66,641	99,551	229,144

[1] Includes particleboard and waferboard bolts.

[2] Contains 128 cubic feet, including wood, bark, and air space.

[3] International 1/4-inch rule.

[4] Includes piling, excelsior, shavings, charcoal, and other specialty products.

Table 3.--Output of roundwood products by ownership class, Forest Survey Unit, and species group, Wisconsin, 1981

(In thousand cubic feet)

Ownership class and species group	All Units	Forest Survey Unit				
		Northeast Unit	Northwest Unit	Central Unit	Southwest Unit	Southeast Unit
Federal						
National Forest						
Softwoods	6,710	3,204	3,506	--	--	--
Hardwoods	13,376	8,486	4,890	--	--	--
Total	20,086	11,690	8,396	--	--	--
Other						
Softwoods	145	--	--	145	--	--
Hardwoods	101	--	--	101	--	--
Total	246	--	--	246	--	--
State						
Softwoods	2,067	733	515	651	24	144
Hardwoods	4,368	2,809	929	412	77	141
Total	6,435	3,542	1,444	1,063	101	285
County & municipal						
Softwoods	8,198	2,663	4,580	848	--	107
Hardwoods	38,431	14,796	18,189	5,403	3	40
Total	46,629	17,459	22,769	6,251	3	147
Indian						
Softwoods	3,211	2,982	197	32	--	--
Hardwoods	6,488	5,655	828	5	--	--
Total	9,699	8,637	1,025	37	--	--
Private						
Forest Industry						
Softwoods	10,113	3,865	4,318	1,929	--	1
Hardwoods	22,037	10,130	9,204	2,485	179	39
Total	32,150	13,995	13,522	4,414	179	40
Other						
Softwoods	36,197	12,580	6,733	11,826	3,616	1,442
Hardwoods	243,894	51,616	56,494	53,551	46,019	36,214
Total	280,091	64,196	63,227	65,377	49,635	37,656
All owners						
Softwoods	66,641	26,027	19,849	15,431	3,640	1,694
Hardwoods	328,695	93,492	90,534	61,957	46,278	36,434
Total	395,336	119,519	110,383	77,388	49,918	38,128

Table 4.--Number of active primary wood-using mills by Forest Survey Unit and kind of mill, Wisconsin, 1956, 1967, 1973, and 1981

Kind of mill	All units				Northeast Unit			Northwest Unit			Central Unit			Southwest Unit			Southeast Unit		
	1956	1967	1973	1981	1967	1973	1981	1967	1973	1981	1967	1973	1981	1967	1973	1981	1967	1973	1981
Pulp mills	29	27	24	23	7	6	5	3	3	3	9	8	8	--	--	--	8	7	7
Saw mills																			
Large[1/]	8	6	15	23	5	10	12	--	1	3	1	2	3	--	1	3	--	1	2
Medium[2/]	55	73	101	110	17	23	19	12	19	21	14	25	33	23	27	34	7	7	3
Small[3/]	1,565	739	411	480	125	93	111	130	73	117	182	95	87	175	75	78	127	75	87
All sawmills	1,628	818	527	613	147	126	142	142	93	141	197	122	123	198	103	115	134	83	92
Veneer mills	47	26	19	15	7	5	4	6	5	6	4	4	2	1	--	--	8	5	3
Cooperage mills	5	3	1	1	--	--	--	--	--	--	--	--	--	3	1	1	--	--	--
Charcoal plants	4	2	1	1	--	--	--	--	--	--	--	1	--	1	--	--	1	--	1
Misc. plants[4/]	40	22	11	10	4	3	4	7	2	2	4	2	2	6	3	2	1	1	--
Total	1,753	898	583	663	165	140	155	158	103	152	214	137	135	209	107	118	152	96	103

[1/] Annual lumber production of 5 million board feet or more.

[2/] Annual lumber production from 1 million to 4.999 million board feet.

[3/] Annual lumber production less than 1 million board feet.

[4/] Includes waferboard, particleboard, treating, fence, excelsior, and specialty plants.

Table 5.--Roundwood receipts by type of mill in Wisconsin, 1956, 1967, 1973, and 1981

(In million cubic feet)

Type of mill	All species				Softwoods				Hardwoods			
	1956	1967	1973	1981	1956	1967	1973	1981	1956	1967	1973	1981
Pulpmills[1/]	164.3	195.1	179.2	208.7	89.8	79.4	63.0	62.7	74.5	115.7	116.2	146.0
Sawmills	67.8	47.8	68.0	94.4	14.5	5.1	8.8	15.8	53.3	42.7	59.2	78.6
Other mills[2/]	21.5	12.0	12.5	6.6	[3/]	[3/]	[3/]	0.2	21.5	12.0	12.5	6.4
All mills	253.6	254.9	259.7	309.7	104.3	84.5	71.8	78.7	149.3	170.4	187.9	231.0

[1/] Includes particleboard and waferboard mills in 1981.

[2/] Does not include treating plants; includes particleboard mills in 1967 and 1973.

[3/] Less than 0.05 million cubic feet.

Table 6.--Wisconsin pulpwood production by species group, 1946-1981

(In thousand standard cords, unpeeled)[1/]

Year	Total	Roundwood								Residue	
		Pine	Balsam fir	Hemlock	Spruce	Tamarack	Aspen	Birch	Other hardwoods	Soft-woods	Hard-woods
1946	428	75	48	64	32	3	202	4	[2/]	[2/]	[2/]
1947	493	157	53	50	31	6	187	8	[2/]	[2/]	1
1948	468	117	87	51	34	3	167	8	[2/]	[2/]	1
1949	427	72	78	47	33	1	184	10	--	[2/]	2
1950	468	93	69	47	31	[2/]	195	6	20	1	6
1951	565	102	55	51	30	1	281	28	17	--	--
1952	582	95	76	66	39	1	275	15	15	--	--
1953	553	71	45	51	26	1	306	12	41	--	--
1954	691	113	56	63	31	4	348	27	49	--	--
1955	710	121	48	58	23	4	365	16	75	--	--
1956	960	140	45	56	23	4	507	21	164	--	--
1957	934	126	60	57	27	6	453	27	178	--	--
1958	828	148	62	55	23	6	369	18	147	--	--
1959	972	186	52	49	21	6	431	26	159	5	37
1960	1,052	124	50	52	18	6	540	27	204	4	27
1961	1,078	154	61	47	23	7	530	34	201	3	18
1962	1,140	188	46	42	15	6	572	41	188	6	36
1963	1,302	170	60	52	19	6	613	50	233	13	86
1964	1,244	168	57	52	20	5	603	41	222	11	65
1965	1,253	207	50	60	15	4	607	24	197	14	75
1966	1,536	215	55	69	17	3	810	39	243	12	73
1967	1,417	174	48	42	13	3	739	84	203	10	101
1968	1,298	199	51	44	11	5	629	57	185	16	101
1969	1,450	216	50	51	13	2	697	62	238	15	106
1970	1,656	259	68	53	16	4	771	76	296	19	94
1971	1,552	268	54	42	12	3	736	51	269	16	101
1972	1,538	246	49	42	13	3	685	47	333	10	110
1973	1,758	232	67	32	16	1	761	73	400	21	155
1974	2,053	291	85	45	19	2[3/]	797	102	506	26	180
1975	1,505	240	98	45	25	4[3/]	588	83	244	36	142
1976	1,840	286	89	43	19	3[3/]	694	114	425	38	129
1977	1,816	297	73	43	19	5[3/]	696	103	383	48	149
1978	1,895	358	75	52	20	4[3/]	669	121	373	40	183
1979[4/]	2,109	361	84	40	19	2[3/]	751	151	441	49	211
1980[4/]	2,362	388	101	34	32	4[3/]	873	185	456	40	249
1981[4/]	2,389	419	105	29	27	5	965	159	389	47	244

[1/] 128 cubic feet consisting of 79 cubic feet of wood and 49 cubic feet of bark and air space.

[2/] Less than 500 cords.

[3/] Includes cedar.

[4/] Includes logs, bolts, and wood residue used in manufacturing particleboard and waferboard.

Table 7.--Wisconsin pulpwood production by species group and destination, 1981

(In thousand standard cords, unpeeled)[1/]

Species group	Total	Destination of wood			
		Wisconsin	Michigan	Minnesota	Other States & Canada
Roundwood[2/]					
Pine	419	413	3	2	1
Balsam fir	105	104	1	--	--
Hemlock	29	28	1	--	--
Spruce	27	27	[3/]	--	--
Tamarack	5	5	[3/]	--	--
Aspen	965	933	1	31	[3/]
Birch	159	159	[3/]	--	[3/]
Other hardwoods	389	385	[3/]	1	3
Total	2,098	2,054	6	34	4
Residue					
Softwoods	47	47	[3/]	--	--
Hardwoods	244	219	20	--	5
Total	291	266	20	--	5
All material	2,389	2,320	26	34	9

[1/] 128 cubic feet consisting of 79 cubic feet of wood and 49 cubic feet of bark and air space.

[2/] Includes chips from roundwood.

[3/] Less than 500 cords.

Table 8.--Pulpwood production from roundwood by species group, Forest Survey Unit and county, Wisconsin, 1981

(In standard cords, unpeeled)[1/]

Unit and county	All species	Species group											
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar	Basswood
Northeast Unit													
Florence	56,342	--	5,348	820	1,169	2,427	327	1,843	178	434	32,619	--	92
Forest	127,994	--	22,692	2,189	780	5,812	72	7,187	146	1,878	49,861	--	1,520
Langlade	83,943	--	6,645	303	227	2,718	25	1,083	137	2,168	41,051	--	1,297
Lincoln	90,516	--	3,558	629	1,588	4,132	1,460	901	257	3,663	46,960	--	3,761
Marinette	159,377	--	11,585	1,212	17,491	11,137	543	3,911	121	1,538	88,291	--	143
Menominee	51,261	--	--	16,338	2,976	300	38	11	--	526	20,941	--	--
Oconto	54,041	--	1,569	705	11,027	10,267	269	393	--	385	23,606	--	62
Oneida	147,147	--	20,710	687	6,255	8,920	1,905	4,196	524	2,196	63,489	--	1,416
Shawano	27,859	--	108	521	1,272	5,734	113	--	42	329	11,990	--	14
Vilas	81,380	--	6,724	787	5,675	4,397	1,698	1,942	18	618	36,447	--	555
Total	879,860	--	78,939	24,191	48,460	55,844	6,450	21,467	1,423	13,735	415,255	--	8,860
Northwest Unit													
Ashland	96,426	--	9,713	544	2,442	8,415	812	2,271	335	2,176	42,407	--	216
Barron	1,924	--	--	--	77	90	77	--	--	33	1,146	--	5
Bayfield	136,063	--	1,233	379	15,398	4,435	1,100	228	54	1,536	84,192	416	2
Burnett	49,888	--	22	--	19,209	2,472	20	7	42	40	26,783	--	--
Douglas	116,095	--	490	--	37,507	9,527	146	40	--	165	64,260	208	--
Iron	55,349	--	1,177	276	289	180	338	118	24	1,419	37,539	--	531
Polk	1,938	--	10	--	1,928	--	--	--	--	--	--	--	--
Price	110,796	--	4,719	650	1,170	2,323	161	1,393	1,067	5,505	37,793	--	1,182
Rusk	65,832	--	12	191	409	575	23	--	96	3,575	35,230	--	2,592
Sawyer	115,194	--	4,548	661	3,304	3,554	311	688	659	2,445	75,203	--	946
Taylor	65,695	--	2,211	997	812	1,399	--	310	325	2,650	30,810	--	599
Washburn	54,852	--	1,151	--	9,416	2,821	647	303	37	604	33,897	--	--
Total	870,052	--	25,286	3,698	91,961	35,791	3,635	5,358	2,639	20,148	469,260	624	6,073
Central Unit													
Adams	46,023	--	--	--	14,586	21,948	1,329	--	--	52	438	--	--
Chippewa	25,599	--	--	149	1,354	878	--	--	121	862	12,669	--	546
Clark	40,850	--	--	246	3,083	1,599	29	33	--	708	20,317	--	28
Eau Claire	18,985	--	--	--	8,870	3,792	273	8	--	167	2,406	--	14
Jackson	26,619	--	--	--	11,741	4,122	339	--	10	150	2,911	--	--
Juneau	30,738	--	--	--	12,815	6,218	1,444	--	--	145	1,742	--	--
Marathon	41,679	--	461	547	815	3,988	236	356	31	658	21,988	--	49
Marquette	6,923	--	--	--	1,370	2,582	102	--	26	--	415	--	--
Monroe	13,683	--	--	--	6,830	2,613	200	--	--	146	875	--	--
Portage	18,199	--	23	97	4,034	4,411	1,611	11	707	66	4,409	--	24
Waupaca	13,141	--	40	4	1,103	5,890	983	9	14	117	3,228	--	21
Waushara	13,535	--	--	--	2,004	10,116	1,304	--	--	--	46	--	--
Wood	18,900	--	--	--	2,516	1,478	1,637	62	9	370	8,138	--	--
Total	314,874	--	524	1,043	71,121	69,635	9,487	479	918	3,441	79,582	--	682

(Table 8 continued on next page)

[1/] 128 cubic feet, consisting of 79 cubic feet of wood and 49 cubic feet of bark and air space.

(Table 8 continued)

Unit and county	All species	Species group											
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar	Basswood
Southwest Unit													
Buffalo	42	--	--	--	42	--	--	--	--	--	--	--	--
Crawford	1,437	--	--	--	--	--	--	--	--	41	190	--	75
Dunn	12,663	--	29	--	3,233	8,120	1,159	11	--	3	75	--	--
Grant	1,435	--	--	--	--	--	--	--	--	39	180	--	74
Iowa	--	--	--	--	--	--	--	--	--	--	--	--	--
La Crosse	409	--	--	--	52	277	--	--	--	3	53	--	--
Lafayette	--	--	--	--	--	--	--	--	--	--	--	--	--
Pepin	279	--	--	--	108	111	11	23	--	--	--	--	--
Pierce	63	--	--	--	--	21	31	--	--	--	11	--	--
Richland	--	--	--	--	--	--	--	--	--	--	--	--	--
St. Croix	--	--	--	--	--	--	--	--	--	--	--	--	--
Sauk	5,964	--	--	--	1,625	3,230	233	--	--	33	--	--	--
Trempealeau	2,260	--	--	--	169	1,851	122	--	--	2	--	--	--
Vernon	58	--	--	--	14	16	28	--	--	--	--	--	--
Total	24,610	--	29	--	5,243	13,626	1,584	34	--	121	509	--	149
Southeast Unit													
Brown	794	--	--	--	--	488	--	--	--	--	306	--	--
Calumet	--	--	--	--	--	--	--	--	--	--	--	--	--
Columbia	6,062	--	--	--	285	3,912	122	--	--	130	59	--	--
Dane	--	--	--	--	--	--	--	--	--	--	--	--	--
Dodge	--	--	--	--	--	--	--	--	--	--	--	--	--
Door	26	--	--	--	12	14	--	--	--	--	--	--	--
Fond du Lac	--	--	--	--	--	--	--	--	--	--	--	--	--
Green	--	--	--	--	--	--	--	--	--	--	--	--	--
Green Lake	200	--	--	--	15	152	33	--	--	--	--	--	--
Jefferson	--	--	--	--	--	--	--	--	--	--	--	--	--
Kenosha	25	--	--	--	--	--	--	--	--	--	25	--	--
Kewaunee	38	--	--	--	--	38	--	--	--	--	--	--	--
Manitowoc	--	--	--	--	--	--	--	--	--	--	--	--	--
Milwaukee	--	--	--	--	--	--	--	--	--	--	--	--	--
Outagamie	292	--	--	--	19	96	24	--	--	--	153	--	--
Ozaukee	--	--	--	--	--	--	--	--	--	--	--	--	--
Racine	--	--	--	--	--	--	--	--	--	--	--	--	--
Rock	12	--	--	--	--	--	--	--	--	2	--	--	--
Sheboygan	--	--	--	--	--	--	--	--	--	--	--	--	--
Walworth	1,107	--	--	--	--	1,096	11	--	--	--	--	--	--
Washington	--	--	--	--	--	--	--	--	--	--	--	--	--
Waukesha	186	--	--	--	--	186	--	--	--	--	--	--	--
Winnebago	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	8,742	--	--	--	331	5,982	190	--	--	132	543	--	--
State total	2,098,138	--	104,778	28,932	217,116	180,878	21,346	27,338	4,980	37,577	965,149	624	15,764

(Table 8 continued on next page)

(Table 8 continued)

Unit and county	Species group											
	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Northeast Unit												
Florence	--	3,166	886	--	1,410	--	3,480	1,288	646	156	--	53
Forest	2	9,493	1,861	--	4,986	--	12,631	4,697	1,233	345	--	609
Langlade	--	4,449	1,904	--	3,948	71	12,589	3,775	792	64	--	697
Lincoln	--	5,664	1,290	--	2,524	--	6,933	4,937	2,024	1	--	234
Marinette	25	7,306	248	--	2,264	--	4,729	4,844	3,074	774	--	141
Menominee	--	401	494	--	2,748	146	2,439	2,879	678	200	--	146
Oconto	--	2,610	52	--	512	--	1,097	864	471	123	--	29
Oneida	--	17,590	1,794	--	744	--	7,500	4,709	3,854	208	--	450
Shawano	--	435	343	--	2,460	246	2,266	897	827	97	--	165
Vilas	--	12,787	960	--	445	--	4,800	1,512	1,706	253	--	56
Total	27	63,901	9,832	--	22,041	463	58,464	30,402	15,305	2,221	--	2,580
Northwest Unit												
Ashland	3	6,722	2,592	--	5,508	--	7,237	3,821	1,007	94	--	111
Barron	--	255	11	--	17	--	77	56	64	14	--	2
Bayfield	--	10,046	2,629	--	5,753	--	5,370	2,119	1,133	28	--	12
Burnett	--	258	--	--	173	--	408	293	120	41	--	--
Douglas	--	3,197	37	--	114	--	266	118	10	2	--	8
Iron	--	3,339	1,328	--	2,522	--	3,689	1,641	770	120	--	49
Polk	--	--	--	--	--	--	--	--	--	--	--	--
Price	--	12,345	3,521	--	17,135	--	12,049	5,917	3,055	645	--	166
Rusk	--	6,505	1,429	--	1,154	--	6,219	3,812	3,190	657	--	163
Sawyer	--	8,591	1,187	--	894	--	7,700	2,876	1,142	216	--	269
Taylor	--	3,608	2,726	--	6,524	--	7,381	3,941	1,064	301	--	37
Washburn	--	2,495	141	--	471	--	1,321	860	532	124	--	32
Total	3	57,361	15,601	--	40,265	--	51,717	25,454	12,087	2,242	--	849
Central Unit												
Adams	--	104	32	--	359	--	157	456	4,738	1,824	--	--
Chippewa	--	2,332	802	--	1,046	--	1,405	1,363	1,485	561	--	26
Clark	1	2,608	638	--	1,485	--	1,541	996	4,925	2,580	--	33
Eau Claire	1	324	53	--	229	--	234	440	1,696	442	--	36
Jackson	1	407	47	--	271	--	174	445	4,543	1,428	--	30
Juneau	--	521	2	--	372	--	488	550	4,401	2,040	--	--
Marathon	--	1,447	995	--	2,907	39	2,336	1,359	3,231	206	--	30
Marquette	--	208	--	--	208	--	312	208	972	520	--	--
Monroe	--	293	8	--	333	--	433	469	1,136	345	--	2
Portage	--	216	24	--	80	--	183	192	1,283	822	--	6
Waupaca	--	125	26	--	222	14	275	315	582	157	--	16
Waushara	--	--	--	--	--	--	6	6	53	--	--	--
Wood	--	400	118	--	335	--	293	351	2,387	800	--	6
Total	3	8,985	2,745	--	7,847	53	7,837	7,150	31,432	11,725	--	185

(Table 8 continued on next page)

(Table 8 continued)

Unit and county	Species group											
	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Southwest Unit												
Buffalo	--	--	--	--	--	--	--	--	--	--	--	--
Crawford	--	61	--	14	141	--	71	91	533	202	--	18
Dunn	--	4	--	--	11	--	6	--	7	3	--	2
Grant	--	61	--	12	139	--	72	83	550	207	--	18
Iowa	--	--	--	--	--	--	--	--	--	--	--	--
La Crosse	--	3	--	--	8	--	4	7	--	--	--	2
Lafayette	--	--	--	--	--	--	--	--	--	--	--	--
Pepin	--	--	--	--	--	--	--	--	26	--	--	--
Pierce	--	--	--	--	--	--	--	--	--	--	--	--
Richland	--	--	--	--	--	--	--	--	--	--	--	--
St. Croix	--	--	--	--	--	--	--	--	--	--	--	--
Sauk	--	63	--	--	99	--	155	155	271	98	--	2
Trempealeau	--	14	--	--	8	--	5	5	59	23	--	2
Vernon	--	--	--	--	--	--	--	--	--	--	--	--
Total	--	206	--	26	406	--	313	341	1,446	533	--	44
Southeast Unit												
Brown	--	--	--	--	--	--	--	--	--	--	--	--
Calumet	--	--	--	--	--	--	--	--	--	--	--	--
Columbia	12	208	4	--	175	--	176	113	553	267	--	46
Dane	--	--	--	--	--	--	--	--	--	--	--	--
Dodge	--	--	--	--	--	--	--	--	--	--	--	--
Door	--	--	--	--	--	--	--	--	--	--	--	--
Fond du Lac	--	--	--	--	--	--	--	--	--	--	--	--
Green	--	--	--	--	--	--	--	--	--	--	--	--
Green Lake	--	--	--	--	--	--	--	--	--	--	--	--
Jefferson	--	--	--	--	--	--	--	--	--	--	--	--
Kenosha	--	--	--	--	--	--	--	--	--	--	--	--
Kewaunee	--	--	--	--	--	--	--	--	--	--	--	--
Manitowoc	--	--	--	--	--	--	--	--	--	--	--	--
Milwaukee	--	--	--	--	--	--	--	--	--	--	--	--
Outagamie	--	--	--	--	--	--	--	--	--	--	--	--
Ozaukee	--	--	--	--	--	--	--	--	--	--	--	--
Racine	--	--	--	--	--	--	--	--	--	--	--	--
Rock	1	--	--	--	4	--	2	1	--	--	--	2
Sheboygan	--	--	--	--	--	--	--	--	--	--	--	--
Walworth	--	--	--	--	--	--	--	--	--	--	--	--
Washington	--	--	--	--	--	--	--	--	--	--	--	--
Waukesha	--	--	--	--	--	--	--	--	--	--	--	--
Winnebago	--	--	--	--	--	--	--	--	--	--	--	--
Total	13	208	4	--	179	--	178	114	553	267	--	48
State total	46	130,661	28,182	26	70,738	516	118,509	63,461	60,823	16,988	--	3,706

Table 9.--Pulpwood receipts in Wisconsin by species group, 1946-1981

(In thousand standard cords, unpeeled)[1/]

Year	Total	Roundwood								Residue	
		Pine	Balsam fir	Hemlock	Spruce	Tamarack	Aspen	Birch	Other hardwoods	Soft-woods	Hard-woods
1946	1,902	298	280	233	645	16	416	14	[2/]	[2/]	[2/]
1947	1,722	292	230	134	687	19	346	13	[2/]	[2/]	1
1948	1,741	307	279	136	663	5	333	17	[2/]	[2/]	1
1949	1,426	227	244	101	502	3	332	15	[2/]	[2/]	2
1950	1,442	244	238	91	441	3	387	10	21	1	6
1951	2,097	428	232	120	678	10	569	42	18	--	--
1952	2,059	365	288	131	732	6	490	32	15	--	--
1953	1,689	283	179	76	529	2	552	26	42	--	--
1954	1,919	298	228	125	608	5	566	40	49	--	--
1955	1,777	319	199	92	471	5	590	26	75	--	--
1956	2,136	397	195	143	445	9	754	27	166	--	--
1957	2,247	325	254	116	578	14	739	38	183	--	--
1958	1,866	318	200	90	479	18	583	19	159	--	--
1959	1,881	436	169	87	345	17	619	30	165	7	6
1960	2,114	388	176	97	389	26	785	31	208	7	7
1961	1,972	330	177	92	350	19	741	44	196	12	11
1962	2,124	395	155	99	317	19	784	49	206	51	49
1963	2,429	414	175	114	341	22	877	64	235	96	91
1964	2,271	350	139	110	314	20	855	62	233	96	92
1965	2,290	410	114	120	300	19	899	26	219	91	92
1966	2,701	473	139	162	301	11	1,112	44	270	100	89
1967	2,729	415	140	100	308	42	1,115	91	259	135	124
1968	2,226	405	100	86	200	33	860	59	205	160	118
1969	2,514	456	81	112	208	25	978	63	278	192	121
1970	2,821	498	111	118	208	43	1,088	81	333	189	152
1971	2,581	514	88	83	167	37	1,011	53	295	193	140
1972	2,450	443	82	69	181	31	902	48	354	198	142
1973	2,696	387	103	54	224	28	1,006	68	398	279	149
1974	3,135	508	133	69	161	36	1,109	115	558	257	189
1975	2,344	391	155	73	146	30	791	89	288	216	165
1976	2,713	437	137	66	121	34	926	133	486	256	117
1977	2,596	416	109	43	94	31	915	120	445	299	124
1978	2,676	491	99	50	82	25	888	145	450	301	145
1979[3/]	3,067	567	115	39	76	21	999	178	548	332	192
1980[3/]	3,266	518	147	40	94	34	1,118	231	562	268	254
1981[3/]	3,154	512	135	31	86	31	1,182	189	477	252	259

[1/] 128 cubic feet consisting of 79 cubic feet of wood and 49 cubic feet of bark and air space.

[2/] Less than 500 cords.

[3/] Includes logs and bolts used in manufacturing particleboard and waferboard.

Table 10.-- Pine and spruce pulpwood receipts in Wisconsin by area of origin, 1946-1981

(In thousand standard cords, unpeeled)[1/]

Year	Pine from:						Spruce from:					
	All areas	Wisconsin	Michigan	Minnesota	Other States	Canada	All areas	Wisconsin	Michigan	Minnesota	Other States	Canada
1946	298	75	43	165	9	6	645	32	87	113	16	397
1947	292	116	25	126	20	5	687	31	105	102	4	445
1948	307	117	24	122	29	15	663	34	95	113	6	415
1949	227	72	16	80	47	12	502	33	72	88	8	301
1950	244	93	14	60	49	28	441	31	69	102	13	226
1951	428	99	20	157	99	53	678	30	78	126	38	406
1952	365	92	13	87	129	44	732	39	86	151	3	453
1953	283	67	7	90	78	41	529	25	51	91	26	336
1954	298	112	7	97	49	33	608	31	90	92	18	377
1955	319	118	18	89	61	33	471	23	80	108	20	240
1956	397	136	35	112	87	27	445	23	76	120	26	200
1957	325	124	22	104	49	26	578	28	79	140	38	293
1958	318	147	41	75	33	22	479	23	59	112	22	263
1959	436	184	80	91	56	25	345	21	49	87	11	177
1960	388	123	60	100	80	25	389	18	61	128	[2/]	182
1961	330	154	47	59	44	26	350	23	65	115	--	147
1962	395	188	86	56	65	--	317	15	58	98	--	146
1963	414	169	90	63	85	7	341	19	64	99	--	159
1964	350	167	90	38	55	--	314	20	49	96	[2/]	149
1965	410	206	110	25	58	11	300	16	45	87	[2/]	152
1966	473	215	108	57	92	1	301	18	53	72	4	154
1967	415	174	76	57	105	3	308	14	55	90	4	145
1968	405	199	72	44	82	8	200	11	22	51	[2/]	116
1969	456	216	91	63	86	[2/]	208	13	23	53	--	119
1970	498	259	88	71	80	--	208	16	30	52	--	110
1971	514	268	120	68	58	--	167	11	28	39	--	89
1972	443	246	102	49	46	--	181	13	24	53	--	91
1973	387	231	70	49	37	[2/]	224	16	32	57	--	119
1974	508	289	104	65	48	2	161	19	28	57	--	57
1975	391	237	71	42	41	[2/]	146	25	37	38	--	46
1976	437	281	73	35	48	--	121	19	17	31	--	54
1977	416	279	71	29	37	--	94	16	19	26	--	33
1978	491	347	69	30	45	--	82	16	15	27	--	24
1979[3/]	567	358	127	27	55	[2/]	76	18	16	22	[2/]	20
1980[3/]	518	384	65	35	34	--	94	32	18	38	--	6
1981[3/]	512	414	51	27	20	[2/]	86	27	15	25	--	19

[1/] 128 cubic feet consisting of 79 cubic feet of wood and 49 cubic feet of bark and air space.

[2/] Less than 500 cords.

[3/] Includes logs and bolts used in manufacturing particleboard and waferboard.

Table 11.-- Aspen and other hardwood[1/] pulpwood receipts in Wisconsin by area of origin, 1946-1981

(In thousand standard cords, unpeeled)[2/]

Year	Aspen from:						Other hardwoods from:					
	All areas	Wisconsin	Michigan	Minnesota	Other States	Canada	All areas	Wisconsin	Michigan	Minnesota	Other States	Canada
1946	416	202	157	57	--	--	3/	3/	--	3/	--	--
1947	346	187	114	32	--	13	3/	3/	3/	--	--	--
1948	333	167	120	27	--	19	3/	3/	3/	--	--	--
1949	332	181	117	12	--	22	3/	--	3/	--	--	--
1950	387	186	178	22	--	1	21	20	1	--	3/	--
1951	569	270	220	56	3/	23	18	17	1	--	--	--
1952	490	269	171	35	--	15	15	15	3/	--	--	--
1953	552	299	223	20	--	10	42	41	1	--	3/	--
1954	566	336	207	13	--	10	49	49	--	--	--	--
1955	590	345	229	10	--	6	75	75	--	--	--	--
1956	754	492	240	21	--	1	166	158	8	--	--	--
1957	739	437	281	16	--	5	183	172	11	--	--	--
1958	583	355	213	11	--	4	159	145	14	3/	--	--
1959	619	409	198	12	--	--	165	155	10	--	--	--
1960	785	522	250	13	--	3/	208	198	10	--	--	--
1961	741	516	208	17	--	--	196	191	5	--	--	--
1962	784	556	215	13	--	--	206	179	27	--	--	--
1963	877	592	269	16	--	3/	235	227	8	--	--	--
1964	855	586	249	20	--	--	233	214	19	3/	--	--
1965	899	605	278	16	--	3/	219	187	32	--	3/	--
1966	1,112	802	276	34	--	3/	270	234	36	3/	--	--
1967	1,115	738	327	49	--	1	259	199	39	21	--	--
1968	860	617	216	27	--	3/	205	181	23	1	--	--
1969	978	688	250	40	--	3/	278	233	44	1	--	--
1970	1,088	766	265	51	--	6	333	292	40	1	--	--
1971	1,011	714	249	46	--	2	295	264	31	--	--	--
1972	902	660	207	35	--	--	354	326	28	--	--	--
1973	1,006	754	196	56	--	3/	398	367	31	3/	--	--
1974	1,109	791	228	90	--	3/	558	494	62	2	--	--
1975	791	575	150	66	--	3/	288	239	49	3/	--	--
1976	926	681	165	80	--	--	486	419	66	1	--	--
1977	915	684	163	68	--	--	445	377	67	1	--	--
1978	888	655	164	69	--	--	450	363	81	6	--	--
1979[4/]	999	733	183	83	--	--	548	433	113	2	--	--
1980[4/]	1,118	855	179	84	--	--	562	452	109	1	--	--
1981[4/]	1,182	933	167	82	--	--	477	385	91	1	--	--

1/ "Other hardwoods" includes all hardwood roundwood (and chips from roundwood) except aspen and birch.

2/ 128 cubic feet consisting of 79 cubic feet of wood and 49 cubic feet of bark and air space.

3/ Less than 500 cords.

4/ Includes logs and bolts used in manufacturing particleboard and waferboard.

Table 12.-- Receipts of residue for pulpwood in Wisconsin by area of origin, 1964-1981

(In thousand standard cords, unpeeled)[1/]

Year	Softwoods from:						Hardwoods from:					
	All areas	Wisconsin	Michigan	Minnesota	Other States	Canada	All areas	Wisconsin	Michigan	Minnesota	Other States	Canada
1964	96	11	5	[2/]	80	--	92	53	37	2	--	--
1965	91	10	3	1	77	--	92	63	27	2	--	--
1966	100	7	2	2	89	--	89	58	30	1	[2/]	--
1967	135	6	3	2	124	--	124	81	31	12	[2/]	--
1968	160	14	3	2	141	--	118	81	32	5	--	--
1969	192	14	5	2	171	--	121	83	37	1	--	--
1970	189	12	5	3	169	--	152	81	69	2	--	--
1971	193	9	5	3	176	--	140	85	55	[2/]	--	--
1972	198	10	3	1	184	[2/]	142	100	42	--	--	--
1973	279	17	4	1	254	3	149	121	28	--	--	--
1974	257	24	4	[2/]	221	8	189	157	31	1	--	--
1975	216	36	11	[2/]	135	34	165	122	43	[2/]	[2/]	--
1976	256	38	8	--	155	55	117	99	18	[2/]	--	--
1977	299	47	1	--	189	62	124	105	18	1	--	--
1978	301	39	[2/]	[2/]	198	64	145	128	17	[2/]	--	--
1979[3/]	332	46	3	6	206	71	192	170	9	7	6	--
1980[3/]	268	38	7	2	135	86	254	216	28	8	2	--
1981[3/]	252	47	5	2	142	56	259	219	36	3	1	--

[1/] 128 cubic feet consisting of 79 cubic feet of wood and 49 cubic feet of bark and air space.

[2/] Less than 500 cords.

[3/] Includes logs and bolts used in manufacturing particleboard and waferboard.

Table 13.--Pulpwood receipts in Wisconsin by species group and area of origin, 1981

(In thousand standard cords, unpeeled)[1/]

Species group	Total	Area of origin				
		Wisconsin	Michigan	Minnesota	Other States	Canada
Roundwood[2/]						
Pine	512	414	51	27	20	[3/]
Balsam fir	135	104	30	1	--	--
Hemlock	31	28	3	--	--	--
Spruce	86	27	15	25	--	19
Tamarack	31	5	1	25	--	[3/]
Aspen	1,182	933	167	82	--	--
Birch	189	158	20	11	--	--
Other hardwoods	477	385	91	1	--	--
Total	2,643	2,054	378	172	20	19
Residue						
Softwoods	252	47	5	2	142	56
Hardwoods	259	219	36	3	1	--
Total	511	266	41	5	143	56
All material	3,154	2,320	419	177	163	75

[1/] 128 cubic feet consisting of 79 cubic feet of wood and 49 cubic feet of bark and air space.

[2/] Includes chips from roundwood.

[3/] Less than 500 cords.

Table 14.--Saw log production and receipts in Wisconsin by species group, 1973 and 1981

(In thousand board feet)[1/]

Species group	Production			Receipts		
	1973	1981	Change	1973	1981	Change
Softwoods						
Cedar	884	2,045	1,161	879	3,047	2,168
Balsam fir	448	5,150	4,702	1,890	7,154	5,264
Hemlock	7,031	8,913	1,882	7,095	9,638	2,543
Jack pine	2,945	5,043	2,098	4,295	6,921	2,626
Red pine	8,381	14,669	6,288	10,391	16,544	6,153
White pine	23,624	36,628	13,004	26,212	41,263	15,051
Spruce	259	3,147	2,888	303	4,368	4,065
Tamarack	69	88	19	69	183	114
Total	43,641	75,683	32,042	51,134	89,118	37,984
Hardwoods						
Ash	8,669	11,860	3,191	8,654	12,116	3,462
Aspen	74,339	76,407	2,068	82,192	88,708	6,516
Balsam poplar	382	954	572	461	965	504
Basswood	21,258	28,039	6,781	21,935	29,275	7,340
Beech	2,029	2,702	673	2,066	2,766	700
Paper birch	6,797	9,186	2,389	7,950	10,579	2,629
Yellow birch	5,844	4,658	-1,186	5,930	5,443	-487
Cottonwood	1,598	1,378	-220	1,710	1,383	-327
Elm	58,064	42,840	-15,224	58,687	45,962	-12,725
Hickory	1,395	2,105	710	1,396	2,318	922
Hard maple	39,116	46,753	7,637	40,017	53,608	13,591
Soft maple	17,776	18,607	831	17,982	18,772	790
Red oak	84,669	132,565	47,896	87,894	139,242	51,348
White oak	18,527	34,490	15,963	18,684	35,932	17,248
Walnut	1,300	753	-547	402	823	421
Other hardwoods	1,139	1,795	656	1,197	1,852	655
Total	342,902	415,092	72,190	357,157	449,744	92,587
All species	386,543	490,775	104,232	408,291	538,862	130,571

[1/] International 1/4-inch rule.

Table 15.--Saw log production by Forest Survey Unit, species group,and State of destination, Wisconsin, 1981

(In thousand board feet)[1/]

Species group	All states	State of destination		
		Wisconsin	Michigan	Minnesota
ALL UNITS				
Softwoods				
Cedar	2,045	2,045	--	--
Balsam fir	5,150	5,150	--	--
Hemlock	8,913	8,913	--	--
Jack pine	5,043	5,043	--	--
Red pine	14,669	14,669	--	--
White pine	36,628	36,628	--	--
Spruce	3,147	3,147	--	--
Tamarack	88	88	--	--
Total	75,683	75,683	--	--
Hardwoods				
Ash	11,860	11,808	52	--
Aspen	76,407	76,302	89	16
Balsam poplar	954	954	--	--
Basswood	28,039	27,883	156	--
Beech	2,702	2,702	--	--
Paper birch	9,186	9,160	26	--
Yellow birch	4,658	4,648	10	--
Cottonwood	1,378	1,377	1	--
Elm	42,840	42,818	22	--
Hickory	2,105	2,105	--	--
Hard maple	46,753	46,541	212	--
Soft maple	18,607	18,549	58	--
Red oak	132,565	132,454	111	--
White oak	34,490	34,475	15	--
Walnut	753	753	--	--
Other hardwoods	1,795	1,793	2	--
Total	415,092	414,322	754	16
All species	490,775	490,005	754	16
NORTHEAST UNIT				
Softwoods				
Cedar	1,355	1,355	--	--
Balsam fir	1,309	1,309	--	--
Hemlock	7,721	7,721	--	--
Jack pine	1,151	1,151	--	--
Red pine	5,537	5,537	--	--
White pine	13,418	13,418	--	--
Spruce	823	823	--	--
Tamarack	9	9	--	--
Total	31,323	31,323	--	--
Hardwoods				
Ash	2,847	2,795	52	--
Aspen	36,743	36,654	89	--
Balsam poplar	262	262	--	--
Basswood	8,598	8,442	156	--
Beech	1,688	1,688	--	--
Paper birch	5,596	5,570	26	--
Yellow birch	3,345	3,335	10	--
Cottonwood	239	238	1	--
Elm	20,240	20,218	22	--
Hickory	510	510	--	--
Hard maple	22,554	22,342	212	--
Soft maple	5,417	5,359	58	--
Red oak	9,025	8,914	111	--
White oak	755	740	15	--
Walnut	1	1	--	--
Other hardwoods	409	407	2	--
Total	118,229	117,475	754	--
All species	149,552	148,798	754	--

(Table 15 continued on next page)

[1/] International 1/4-inch rule.

(Table 15 continued)

Species group	All states	State of destination		
		Wisconsin	Michigan	Minnesota
NORTHWEST UNIT				
Softwoods				
Cedar	134	134	--	--
Balsam fir	3,818	3,818	--	--
Hemlock	157	157	--	--
Jack pine	3,616	3,616	--	--
Red pine	6,600	6,600	--	--
White pine	9,163	9,163	--	--
Spruce	2,231	2,231	--	--
Tamarack	71	71	--	--
Total	25,790	25,790	--	--
Hardwoods				
Ash	3,060	3,060	--	--
Aspen	24,679	24,679	--	--
Balsam poplar	502	502	--	--
Basswood	7,222	7,222	--	--
Beech	520	520	--	--
Paper birch	2,529	2,529	--	--
Yellow birch	798	798	--	--
Cottonwood	14	14	--	--
Elm	13,130	13,130	--	--
Hickory	40	40	--	--
Hard maple	8,525	8,525	--	--
Soft maple	2,483	2,483	--	--
Red oak	14,456	14,456	--	--
White oak	2,998	2,998	--	--
Walnut	25	25	--	--
Other hardwoods	134	134	--	--
Total	81,115	81,115	--	--
All species	106,905	106,905	--	--
CENTRAL UNIT				
Softwoods				
Cedar	137	137	--	--
Balsam fir	16	16	--	--
Hemlock	790	790	--	--
Jack pine	167	167	--	--
Red pine	1,974	1,974	--	--
White pine	10,053	10,053	--	--
Spruce	87	87	--	--
Tamarack	--	--	--	--
Total	13,224	13,224	--	--
Hardwoods				
Ash	2,547	2,547	--	--
Aspen	10,876	10,876	--	--
Balsam poplar	11	11	--	--
Basswood	5,174	5,174	--	--
Beech	203	203	--	--
Paper birch	570	570	--	--
Yellow birch	497	497	--	--
Cottonwood	24	24	--	--
Elm	4,481	4,481	--	--
Hickory	367	367	--	--
Hard maple	7,277	7,277	--	--
Soft maple	4,941	4,941	--	--
Red oak	38,487	38,487	--	--
White oak	9,815	9,815	--	--
Walnut	24	24	--	--
Other hardwoods	220	220	--	--
Total	85,514	85,514	--	--
All species	98,738	98,738	--	--

(Table 15 continued on next page)

(Table 15 continued)

Species group	All states	State of destination		
		Wisconsin	Michigan	Minnesota
SOUTHWEST UNIT				
Softwoods				
Cedar	2	2	--	--
Balsam fir	--	--	--	--
Hemlock	--	--	--	--
Jack pine	109	109	--	--
Red pine	486	486	--	--
White pine	3,404	3,404	--	--
Spruce	1	1	--	--
Tamarack	--	--	--	--
Total	4,002	4,002	--	--
Hardwoods				
Ash	1,726	1,726	--	--
Aspen	3,367	3,351	--	16
Balsam poplar	81	81	--	--
Basswood	5,958	5,958	--	--
Beech	--	--	--	--
Paper birch	256	256	--	--
Yellow birch	5	5	--	--
Cottonwood	421	421	--	--
Elm	3,981	3,981	--	--
Hickory	1,000	1,000	--	--
Hard maple	6,752	6,752	--	--
Soft maple	2,773	2,773	--	--
Red oak	64,521	64,521	--	--
White oak	16,389	16,389	--	--
Walnut	484	484	--	--
Other hardwoods	665	665	--	--
Total	108,379	108,363	--	16
All species	112,381	112,365	--	16
SOUTHEAST UNIT				
Softwoods				
Cedar	417	417	--	--
Balsam fir	7	7	--	--
Hemlock	245	245	--	--
Jack pine	--	--	--	--
Red pine	72	72	--	--
White pine	590	590	--	--
Spruce	5	5	--	--
Tamarack	8	8	--	--
Total	1,344	1,344	--	--
Hardwoods				
Ash	1,680	1,680	--	--
Aspen	742	742	--	--
Balsam poplar	98	98	--	--
Basswood	1,087	1,087	--	--
Beech	291	291	--	--
Paper birch	235	235	--	--
Yellow birch	13	13	--	--
Cottonwood	680	680	--	--
Elm	1,008	1,008	--	--
Hickory	188	188	--	--
Hard maple	1,645	1,645	--	--
Soft maple	2,993	2,993	--	--
Red oak	6,076	6,076	--	--
White oak	4,533	4,533	--	--
Walnut	219	219	--	--
Other hardwoods	367	367	--	--
Total	21,855	21,855	--	--
All species	23,199	23,199	--	--

Table 16.--Saw log production by Forest Survey Unit, county and species group, Wisconsin, 1981

(In thousand board feet)[1/]

Unit and county	All species	Species group											
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tama-rack	Ash	Aspen	Balsam poplar	Bass-wood
Northeast Unit													
Florence	5,267	13	14	577	--	107	395	71	--	72	597	--	507
Forest	25,399	225	307	989	34	284	900	112	--	177	7,855	1	1,355
Langlade	12,209	66	55	389	11	394	217	11	--	496	2,610	--	1,140
Lincoln	9,223	3	24	27	2	623	546	13	9	410	1,933	--	679
Marinette	19,271	190	271	1,091	28	414	1,708	141	--	263	6,900	162	1,035
Menominee	18,648	15	--	3,645	--	21	4,190	1	--	108	243	--	1,660
Oconto	14,930	143	136	227	116	401	381	72	--	294	6,117	96	541
Oneida	15,678	103	301	114	514	1,724	2,184	216	--	142	5,133	--	282
Shawano	16,229	572	22	562	--	270	690	8	--	851	1,279	3	1,345
Vilas	12,698	25	179	100	446	1,299	2,207	178	--	34	4,076	--	54
Total	149,552	1,355	1,309	7,721	1,151	5,537	13,418	823	9	2,847	36,743	262	8,598
Northwest Unit													
Ashland	10,461	50	636	16	654	720	1,293	432	63	196	982	--	489
Barron	6,604	--	--	--	3	56	361	--	--	182	1,066	--	444
Bayfield	12,356	5	1,559	--	1,743	2,267	2,102	961	--	24	2,069	--	73
Burnett	3,317	--	--	--	146	244	253	--	2	69	878	--	55
Douglas	1,931	--	442	--	25	161	157	58	--	20	777	--	25
Iron	7,744	42	309	11	298	444	488	254	--	116	2,401	--	258
Polk	8,121	--	--	--	12	26	106	--	--	338	1,099	--	628
Price	17,078	12	155	60	22	298	993	79	6	755	3,677	--	2,562
Rusk	15,249	--	1	6	--	455	779	5	--	488	4,521	502	1,466
Sawyer	11,055	2	325	16	329	511	1,276	196	--	419	3,945	--	569
Taylor	9,010	23	42	48	--	808	965	29	--	448	1,893	--	572
Washburn	3,979	--	349	--	384	610	390	217	--	5	1,371	--	81
Total	106,905	134	3,818	157	3,616	6,600	9,163	2,231	71	3,060	24,679	502	7,222
Central Unit													
Adams	1,496	--	--	--	--	58	360	--	--	30	28	--	26
Chippewa	15,735	1	--	--	--	149	658	--	--	311	3,240	--	762
Clark	13,271	--	--	--	--	195	1,413	--	--	412	2,024	--	1,017
Eau Claire	7,885	--	5	--	--	323	1,225	10	--	93	615	--	112
Jackson	6,340	--	--	--	128	181	1,255	50	--	39	309	--	149
Juneau	6,179	--	--	--	--	70	394	--	--	66	1,140	--	146
Marathon	12,634	30	11	478	--	144	521	27	--	527	1,404	--	1,362
Marquette	838	--	--	--	--	33	75	--	--	19	14	--	11
Monroe	9,342	--	--	--	--	128	1,020	--	--	89	204	--	139
Portage	4,103	5	--	55	8	211	794	--	--	64	562	--	386
Waupaca	13,683	98	--	257	3	47	1,452	--	--	587	564	11	727
Waushara	2,201	--	--	--	--	238	232	--	--	122	96	--	24
Wood	5,031	3	--	--	28	197	654	--	--	188	676	--	313
Total	98,738	137	16	790	167	1,974	10,053	87	--	2,547	10,876	11	5,174

(Table 16 continued on next page)

[1/] International 1/4-inch rule.

(Table 16 continued)

Unit and county	All species	Species group											
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar	Basswood
Southwest Unit													
Buffalo	15,470	--	--	--	--	5	71	--	--	135	270	81	701
Crawford	6,990	--	--	--	--	--	--	--	--	126	54	--	159
Dunn	14,215	--	--	--	108	254	2,565	--	--	352	681	--	1,038
Grant	8,149	1	--	--	1	11	5	--	--	62	51	--	322
Iowa	5,353	--	--	--	--	--	1	--	--	58	33	--	159
La Crosse	6,727	--	--	--	--	--	1	--	--	59	110	--	112
Lafayette	310	--	--	--	--	--	--	--	--	--	--	--	5
Pepin	3,465	--	--	--	--	56	254	--	--	66	77	--	198
Pierce	5,413	--	--	--	--	--	7	--	--	172	82	--	1,393
Richland	6,878	--	--	--	--	--	63	--	--	222	366	--	482
St. Croix	783	--	--	--	--	--	24	--	--	31	16	--	43
Sauk	11,890	1	--	--	--	4	56	--	--	118	529	--	446
Trempealeau	13,405	--	--	--	--	134	261	--	--	81	828	--	407
Vernon	13,333	--	--	--	--	22	96	1	--	244	270	--	493
Total	112,381	2	--	--	109	486	3,404	1	--	1,726	3,367	81	5,958
Southeast Unit													
Brown	1,137	22	2	--	--	18	83	--	--	68	35	22	42
Calumet	491	2	--	--	--	--	9	--	--	20	7	2	93
Columbia	2,881	--	--	--	--	14	61	--	--	26	30	--	119
Dane	1,966	--	--	--	--	--	--	1	--	6	4	--	55
Dodge	795	2	--	--	--	--	--	--	--	126	1	--	22
Door	928	130	4	57	--	25	64	2	3	41	129	41	28
Fond du Lac	361	2	1	--	--	1	1	--	--	34	3	--	40
Green	829	--	--	--	--	--	--	--	--	38	--	--	44
Green Lake	406	--	--	--	--	10	17	--	--	5	5	--	2
Jefferson	447	--	--	--	--	--	--	--	--	39	1	--	24
Kenosha	73	--	--	--	--	--	--	--	--	--	--	--	--
Kewaunee	1,441	159	--	83	--	--	60	1	2	138	117	29	58
Manitowoc	2,844	89	--	105	--	2	163	--	2	191	57	3	117
Milwaukee	287	--	--	--	--	--	--	--	--	--	--	--	11
Outagamie	2,166	--	--	--	--	--	39	--	--	415	339	1	122
Ozaukee	291	3	--	--	--	--	--	--	--	53	1	--	7
Racine	723	--	--	--	--	2	--	1	--	26	--	--	21
Rock	1,113	--	--	--	--	--	--	--	--	18	--	--	29
Sheboygan	1,998	8	--	--	--	--	86	--	--	231	13	--	189
Walworth	507	--	--	--	--	--	--	--	--	39	--	--	3
Washington	964	--	--	--	--	--	--	--	--	147	--	--	40
Waukesha	340	--	--	--	--	--	--	--	--	--	--	--	19
Winnebago	211	--	--	--	--	--	7	--	1	19	--	--	2
Total	23,199	417	7	245	--	72	590	5	8	1,680	742	98	1,087
State total	490,775	2,045	5,150	8,913	5,043	14,669	36,628	3,147	88	11,860	76,407	954	28,039

(Table 16 continued on next page)

(Table 16 continued)

Unit and county	Species group											
	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Northeast Unit												
Florence	--	74	238	--	505	--	1,811	85	187	--	--	14
Forest	--	747	922	--	5,251	--	5,564	315	303	--	--	58
Langlade	405	497	241	--	1,996	25	2,579	526	458	39	--	54
Lincoln	45	385	84	170	1,187	182	1,329	548	1,005	4	--	15
Marinette	147	724	286	7	607	--	1,891	1,160	1,883	349	--	14
Menominee	251	7	470	--	4,705	16	2,399	220	641	4	--	52
Oconto	196	804	346	35	1,665	--	1,352	1,239	514	240	--	15
Oneida	--	1,178	225	--	920	--	1,049	324	1,259	--	--	10
Shawano	644	211	173	27	2,636	287	3,538	800	2,035	100	1	175
Vilas	--	969	360	--	768	--	1,042	200	740	19	--	2
Total	1,688	5,596	3,345	239	20,240	510	22,554	5,417	9,025	755	1	409
Northwest Unit												
Ashland	--	109	180	--	3,133	--	1,207	83	192	15	--	11
Barron	--	10	6	1	523	1	624	148	2,452	681	--	46
Bayfield	--	601	19	--	16	--	130	37	722	28	--	--
Burnett	--	85	--	3	107	--	35	13	968	457	--	2
Douglas	--	42	3	--	--	--	30	5	186	--	--	--
Iron	--	371	170	--	1,196	--	884	123	364	15	--	--
Polk	--	31	--	10	570	15	354	96	3,401	1,426	--	9
Price	364	350	127	--	3,467	--	2,425	936	724	49	5	12
Rusk	52	17	104	--	2,181	24	1,366	347	2,781	129	10	15
Sawyer	52	764	45	--	776	--	516	204	1,031	60	--	19
Taylor	52	134	143	--	1,105	--	921	453	1,263	85	10	16
Washburn	--	15	1	--	56	--	33	38	372	53	--	4
Total	520	2,529	798	14	13,130	40	8,525	2,483	14,456	2,998	25	134
Central Unit												
Adams	--	11	--	6	39	1	29	49	697	161	--	1
Chippewa	--	108	2	--	617	12	516	465	7,122	1,770	2	--
Clark	--	8	107	--	650	9	1,614	831	3,844	1,103	10	34
Eau Claire	--	5	2	1	139	13	114	200	3,993	1,026	6	3
Jackson	--	22	--	--	74	52	54	60	3,172	777	1	17
Juneau	--	16	--	16	130	24	137	204	3,129	706	--	1
Marathon	108	176	329	--	1,188	30	2,344	1,002	2,722	175	1	55
Marquette	--	3	1	--	18	--	13	42	447	161	--	1
Monroe	--	17	--	1	241	151	395	110	5,352	1,488	3	4
Portage	--	14	3	--	69	8	97	181	1,409	226	--	11
Waupaca	95	155	37	--	1,002	65	1,591	1,411	3,929	1,584	--	68
Waushara	--	23	5	--	46	2	34	177	838	358	--	6
Wood	--	12	11	--	268	--	339	209	1,833	280	1	19
Total	203	570	497	24	4,481	367	7,277	4,941	38,487	9,815	24	220

(Table 16 continued on next page)

(Table 16 continued)

Unit and county	Species group											
	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Southwest Unit												
Buffalo	--	58	--	138	576	206	215	253	11,223	1,373	10	155
Crawford	--	17	--	11	245	50	382	--	4,733	1,103	70	40
Dunn	--	28	1	57	577	41	1,104	459	5,805	1,086	--	59
Grant	--	--	--	55	382	8	201	190	3,636	2,970	213	41
Iowa	--	--	--	1	110	57	75	24	3,089	1,678	52	16
La Crosse	--	22	--	6	169	123	98	179	4,881	959	2	6
Lafayette	--	--	--	--	7	--	--	--	37	249	7	5
Pepin	--	5	--	9	128	13	279	76	1,795	497	--	12
Pierce	--	21	4	58	631	26	1,401	127	1,248	239	--	4
Richland	--	--	--	10	245	27	1,235	111	3,051	941	74	51
St. Croix	--	--	--	--	71	5	83	37	396	36	5	36
Sauk	--	--	--	10	205	85	425	565	7,637	1,652	40	117
Trempealeau	--	68	--	36	241	118	172	236	9,163	1,574	--	86
Vernon	--	37	--	30	394	241	1,082	516	7,827	2,032	11	37
Total	--	256	5	421	3,981	1,000	6,752	2,773	64,521	16,389	484	665
Southeast Unit												
Brown	22	42	1	188	65	--	70	86	249	111	--	11
Calumet	7	1	--	9	21	1	117	32	67	103	--	--
Columbia	--	--	--	17	159	6	147	34	929	1,290	1	48
Dane	--	--	--	3	22	16	29	23	1,095	545	58	109
Dodge	--	--	--	19	36	6	98	32	220	203	2	28
Door	78	100	4	16	16	--	50	25	103	4	1	7
Fond du Lac	5	2	--	2	20	17	42	71	77	38	--	5
Green	--	--	--	--	38	7	36	25	371	172	67	31
Green Lake	1	1	--	--	6	2	8	3	174	170	--	2
Jefferson	--	--	--	2	9	12	45	--	111	168	6	30
Kenosha	--	--	--	10	32	--	--	--	18	10	3	--
Kewaunee	41	31	--	34	32	--	64	545	35	10	--	2
Manitowoc	69	53	8	64	40	1	241	1,012	487	135	--	5
Milwaukee	--	--	--	11	92	--	22	22	43	86	--	--
Outagamie	1	2	--	216	131	1	44	575	133	115	1	31
Ozaukee	1	--	--	--	5	--	8	179	24	10	--	--
Racine	--	--	--	36	40	43	70	32	229	214	7	2
Rock	--	--	--	17	70	16	65	76	432	303	49	38
Sheboygan	59	3	--	10	109	18	231	118	613	304	--	6
Walworth	--	--	--	9	--	22	30	5	209	157	24	9
Washington	7	--	--	--	21	20	191	8	348	179	--	3
Waukesha	--	--	--	16	32	--	32	32	69	140	--	--
Winnebago	--	--	--	1	12	--	5	58	40	66	--	--
Total	291	235	13	680	1,008	188	1,645	2,993	6,076	4,533	219	367
State total	2,702	9,186	4,658	1,378	42,840	2,105	46,753	18,607	132,565	34,490	753	1,795

Table 17.--Saw log receipts in Wisconsin by Forest Survey Unit, species group, and area of origin, 1981

(In thousand board feet)[1/]

Species group	All areas	Area of origin					
		Wisconsin	Michigan	Minnesota	Iowa	Illinois	Canada
ALL UNITS							
Softwoods							
Cedar	3,047	2,045	997	5	--	--	--
Balsam fir	7,154	5,150	1,088	916	--	--	--
Hemlock	9,638	8,913	725	--	--	--	--
Jack pine	6,921	5,043	1,292	586	--	--	--
Red pine	16,544	14,669	1,460	415	--	--	--
White pine	41,263	36,628	4,198	437	--	--	--
Spruce	4,368	3,147	831	390	--	--	--
Tamarack	183	88	50	45	--	--	--
Total	89,118	75,683	10,641	2,794	--	--	--
Hardwoods							
Ash	12,116	11,808	214	93	1	--	--
Aspen	88,708	76,302	11,978	428	--	--	--
Balsam poplar	965	954	11	--	--	--	--
Basswood	29,275	27,883	1,232	149	11	--	--
Beech	2,766	2,702	64	--	--	--	--
Paper birch	10,579	9,160	1,392	26	--	--	1
Yellow birch	5,443	4,648	795	--	--	--	--
Cottonwood	1,383	1,377	--	6	--	--	--
Elm	45,962	42,818	2,745	382	17	--	--
Hickory	2,318	2,105	99	114	--	--	--
Hard maple	53,608	46,541	6,795	249	23	--	--
Soft maple	18,772	18,549	214	9	--	--	--
Red oak	139,242	132,454	2,709	3,587	481	11	--
White oak	35,932	34,475	493	770	168	26	--
Walnut	823	753	2	13	55	--	--
Other hardwoods	1,852	1,793	53	5	1	--	--
Total	449,744	414,322	28,796	5,831	757	37	1
All species	538,862	490,005	39,437	8,625	757	37	1
NORTHEAST UNIT							
Softwoods							
Cedar	2,161	1,273	888	--	--	--	--
Balsam fir	1,097	1,006	91	--	--	--	--
Hemlock	7,217	6,653	564	--	--	--	--
Jack pine	963	736	227	--	--	--	--
Red pine	5,887	5,130	757	--	--	--	--
White pine	16,167	12,714	3,453	--	--	--	--
Spruce	684	523	161	--	--	--	--
Tamarack	9	9	--	--	--	--	--
Total	34,185	28,044	6,141	--	--	--	--
Hardwoods							
Ash	3,088	2,984	104	--	--	--	--
Aspen	49,386	37,966	11,420	--	--	--	--
Balsam poplar	284	273	11	--	--	--	--
Basswood	9,337	8,221	1,116	--	--	--	--
Beech	1,804	1,762	42	--	--	--	--
Paper birch	7,908	6,549	1,359	--	--	--	--
Yellow birch	3,838	3,380	458	--	--	--	--
Cottonwood	31	31	--	--	--	--	--
Elm	24,630	22,067	2,563	--	--	--	--
Hickory	405	405	--	--	--	--	--
Hard maple	30,131	24,768	5,363	--	--	--	--
Soft maple	5,937	5,766	171	--	--	--	--
Red oak	12,049	11,725	324	--	--	--	--
White oak	803	798	5	--	--	--	--
Walnut	2	2	--	--	--	--	--
Other hardwoods	492	442	50	--	--	--	--
Total	150,125	127,139	22,986	--	--	--	--
All species	184,310	155,183	29,127	--	--	--	--

(Table 17 continued on next page)

[1/] International 1/4-inch rule.

(Table 17 continued)

NORTHWEST UNIT

Species group	All areas	Area of origin					
		Wisconsin	Michigan	Minnesota	Iowa	Illinois	Canada
Softwoods							
Cedar	161	86	70	5	--	--	--
Balsam fir	6,021	4,108	997	916	--	--	--
Hemlock	260	138	122	--	--	--	--
Jack pine	5,671	4,020	1,065	586	--	--	--
Red pine	7,532	6,414	703	415	--	--	--
White pine	9,165	8,083	645	437	--	--	--
Spruce	3,369	2,359	620	390	--	--	--
Tamarack	166	71	50	45	--	--	--
Total	32,345	25,279	4,272	2,794	--	--	--
Hardwoods							
Ash	2,186	2,149	22	15	--	--	--
Aspen	20,474	19,514	553	407	--	--	--
Balsam poplar	502	502	--	--	--	--	--
Basswood	5,237	5,083	97	57	--	--	--
Beech	542	520	22	--	--	--	--
Paper birch	1,463	1,462	--	1	--	--	--
Yellow birch	753	429	324	--	--	--	--
Cottonwood	20	14	--	6	--	--	--
Elm	10,050	9,877	--	173	--	--	--
Hickory	52	52	--	--	--	--	--
Hard maple	6,571	5,360	1,199	12	--	--	--
Soft maple	1,696	1,669	22	5	--	--	--
Red oak	10,503	10,386	11	106	--	--	--
White oak	2,537	2,505	--	32	--	--	--
Walnut	5	5	--	--	--	--	--
Other hardwoods	79	79	--	--	--	--	--
Total	62,670	59,606	2,250	814	--	--	--
All species	95,015	84,885	6,522	3,608	--	--	--

CENTRAL UNIT

Softwoods							
Cedar	245	206	39	--	--	--	--
Balsam fir	31	31	--	--	--	--	--
Hemlock	1,507	1,468	39	--	--	--	--
Jack pine	70	70	--	--	--	--	--
Red pine	2,372	2,372	--	--	--	--	--
White pine	10,749	10,649	100	--	--	--	--
Spruce	309	259	50	--	--	--	--
Total	15,283	15,055	228	--	--	--	--
Hardwoods							
Ash	2,917	2,899	18	--	--	--	--
Aspen	14,815	14,815	--	--	--	--	--
Basswood	6,485	6,485	--	--	--	--	--
Beech	46	46	--	--	--	--	--
Paper birch	566	556	10	--	--	--	--
Yellow birch	765	752	13	--	--	--	--
Cottonwood	433	433	--	--	--	--	--
Elm	5,774	5,738	36	--	--	--	--
Hickory	397	397	--	--	--	--	--
Hard maple	7,191	7,045	92	54	--	--	--
Soft maple	5,022	5,001	21	--	--	--	--
Red oak	39,504	39,327	42	135	--	--	--
White oak	10,730	10,649	--	81	--	--	--
Walnut	47	47	--	--	--	--	--
Other hardwoods	266	266	--	--	--	--	--
Total	94,958	94,456	232	270	--	--	--
All species	110,241	109,511	460	270	--	--	--

(Table 17 continued on next page)

(Table 17 continued)

Species group	All areas	Area of origin					
		Wisconsin	Michigan	Minnesota	Iowa	Illinois	Canada
SOUTHWEST UNIT							
Softwoods							
Cedar	1	1	--	--	--	--	--
Jack pine	217	217	--	--	--	--	--
Red pine	445	445	--	--	--	--	--
White pine	3,290	3,290	--	--	--	--	--
Spruce	1	1	--	--	--	--	--
Total	3,954	3,954	--	--	--	--	--
Hardwoods							
Ash	1,936	1,787	78	70	1	--	--
Aspen	2,272	2,246	21	5	--	--	--
Balsam poplar	81	81	--	--	--	--	--
Basswood	6,304	6,182	92	19	11	--	--
Paper birch	331	283	25	23	--	--	--
Yellow birch	4	4	--	--	--	--	--
Cottonwood	383	383	--	--	--	--	--
Elm	4,081	3,709	209	146	17	--	--
Hickory	1,226	1,013	114	99	--	--	--
Hard maple	7,278	6,931	183	141	23	--	--
Soft maple	2,382	2,378	4	--	--	--	--
Red oak	70,505	64,346	3,346	2,332	481	--	--
White oak	17,791	16,478	657	488	168	--	--
Walnut	488	428	3	2	55	--	--
Other hardwoods	643	634	5	3	1	--	--
Total	115,705	106,883	4,737	3,328	757	--	--
All species	119,659	110,837	4,737	3,328	757	--	--
SOUTHEAST UNIT							
Softwoods							
Cedar	479	479	--	--	--	--	--
Balsam fir	5	5	--	--	--	--	--
Hemlock	654	654	--	--	--	--	--
Red pine	308	308	--	--	--	--	--
White pine	1,892	1,892	--	--	--	--	--
Spruce	5	5	--	--	--	--	--
Tamarack	8	8	--	--	--	--	--
Total	3,351	3,351	--	--	--	--	--
Hardwoods							
Ash	1,989	1,989	--	--	--	--	--
Aspen	1,761	1,761	--	--	--	--	--
Balsam poplar	98	98	--	--	--	--	--
Basswood	1,912	1,912	--	--	--	--	--
Beech	374	374	--	--	--	--	--
Paper birch	311	310	--	--	--	--	1
Yellow birch	83	83	--	--	--	--	--
Cottonwood	516	516	--	--	--	--	--
Elm	1,427	1,427	--	--	--	--	--
Hickory	238	238	--	--	--	--	--
Hard maple	2,437	2,437	--	--	--	--	--
Soft maple	3,735	3,735	--	--	--	--	--
Red oak	6,681	6,670	--	--	--	11	--
White oak	4,071	4,045	--	--	--	26	--
Walnut	281	271	--	10	--	--	--
Other hardwoods	372	372	--	--	--	--	--
Total	26,286	26,238	--	10	--	37	1
All species	29,637	29,589	--	10	--	37	1

Table 18.--Veneer log production and receipts in Wisconsin for selected years, 1946-1981

(In thousand board feet)[1/]

Year	Production	Receipts
1946	29,267	68,116
1948	32,026	71,791
1950	26,652	62,935
1952	29,956	59,500
1954	27,109	59,573
1956	30,403	66,949
1958	23,740	43,063
1960	25,467	51,298
1962	21,919	37,517
1963	25,203	41,918
1965	23,782	43,104
1966	22,867	42,162
1968	21,037	37,571
1970	15,814	29,896
1972	19,465	36,491
1973	32,224[2/]	37,804
1974	37,342[2/]	41,605
1975	31,692[2/]	33,294
1976	31,685[2/]	36,971
1980	20,863[2/]	27,903
1981	27,250[2/]	34,540

[1/] International 1/4-inch rule.

[2/] Includes Wisconsin veneer logs received at Iron Wood Products Co.; such receipts are not shown before 1973.

Table 19.--Veneer log production and receipts by species group in Wisconsin, 1973 and 1981

(In thousand board feet)[1/]

Species group	Production			Receipts		
	1973	1981	Change	1973	1981	Change
White pine	45	44	-1	45	174	129
Ash	355	290	-65	463	590	127
Aspen	11,538	12,971	1,433	445	572	127
Balsam poplar	21	--	-21	21	--	-21
Basswood	1,149	1,042	-107	2,140	1,575	-565
Beech	41	4	-37	581	67	-514
Paper birch	195	441	246	769	576	-193
Yellow birch	843	1,291	448	3,415	2,497	-918
Cottonwood	54	83	29	1,109	521	-588
Elm	4,890	1,988	-2,902	5,999	2,370	-3,629
Hard maple	4,090	2,321	-1,769	11,442	12,744	1,302
Soft maple	654	511	-143	1,000	1,179	179
Red oak	7,312	5,939	-1,373	10,195	11,293	1,098
White oak	118	244	126	80	338	258
Walnut	667	34	-633	--	--	--
Other species	252	47	-205	100	44	-56
All species	32,224	27,250	-4,974	37,804	34,540	-3,264

[1/] International 1/4-inch rule.

Table 20.--Veneer log production by species group and State or country of destination, Wisconsin, 1981

(In thousand board feet)[1/]

Species group	Total	Destination of wood						
		Wisconsin	Michigan	Indiana	Kentucky	Minnesota	Canada	Other Countries
Softwoods								
White pine	44	44	--	--	--	--	--	--
Total	44	44	--	--	--	--	--	--
Hardwoods								
Ash	290	290	--	--	--	--	--	--
Aspen	12,971	571	12,384	--	--	16	--	--
Basswood	1,042	1,042	--	--	--	--	--	--
Beech	4	4	--	--	--	--	--	--
Paper birch	441	441	--	--	--	--	--	--
Yellow birch	1,291	1,283	--	--	--	--	--	8
Cottonwood	83	83	--	--	--	--	--	--
Elm	1,988	1,846	--	--	--	--	30	112
Hard maple	2,321	2,321	--	--	--	--	--	--
Soft maple	511	511	--	--	--	--	--	--
Red oak	5,939	5,641	--	234	--	--	--	64
White oak	244	145	--	--	23	--	--	76
Walnut	34	--	--	--	34	--	--	--
Other hardwoods	47	23	--	--		--	24	--
Total	27,206	14,201	12,384	234	57	16	54	260
All species	27,250	14,245	12,384	234	57	16	54	260

[1/] International 1/4-inch rule.

Table 21.--Veneer log production by Forest Survey Unit, county, and species group, Wisconsin, 1981

(In thousand board feet)[1/]

Unit and county	All species	Species group														
		White pine	Ash	Aspen	Bass-wood	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Northeast Unit																
Florence	496	2	3	--	--	--	19	239	--	73	132	--	28	--	--	--
Forest	721	--	1	6	71	--	20	106	--	238	245	2	27	--	--	5
Langlade	715	--	3	37	63	2	15	47	--	129	250	15	131	16	--	7
Lincoln	369	--	1	8	15	--	21	33	--	105	106	11	69	--	--	--
Marinette	730	14	27	--	--	--	56	28	--	131	101	34	326	8	--	5
Menominee	547	--	--	--	--	--	9	167	--	79	183	5	104	--	--	--
Oconto	259	--	--	--	--	--	27	29	--	112	47	6	38	--	--	--
Oneida	394	--	11	1	20	--	46	49	--	20	62	5	180	--	--	--
Shawano	1,370	1	38	49	152	2	20	42	--	246	346	133	306	5	--	30
Vilas	1,207	--	--	894	--	--	35	71	--	20	84	--	103	--	--	--
Total	6,808	17	84	995	321	4	268	811	--	1,153	1,556	211	1,312	29	--	47
Northwest Unit																
Ashland	265	6	27	--	35	--	14	56	--	16	68	--	43	--	--	--
Barron	338	1	--	64	44	--	4	7	--	29	9	5	175	--	--	--
Bayfield	5,161	10	--	4,947	28	--	23	29	--	16	70	16	22	--	--	--
Burnett	86	--	--	3	6	--	7	5	--	6	14	1	44	--	--	--
Douglas	1,274	--	--	1,201	16	--	12	14	--	14	17	--	--	--	--	--
Iron	5,559	--	23	5,356	21	--	9	33	--	17	24	--	71	5	--	--
Polk	236	--	--	18	22	--	5	5	--	62	6	3	115	--	--	--
Price	454	--	37	--	38	--	17	63	--	84	72	16	120	7	--	--
Rusk	625	--	--	96	86	--	8	11	--	70	19	9	326	--	--	--
Sawyer	499	10	30	96	63	--	18	50	--	24	56	4	148	--	--	--
Taylor	321	--	20	3	75	--	9	29	--	46	71	10	58	--	--	--
Washburn	337	--	--	170	17	--	8	8	--	40	11	2	81	--	--	--
Total	15,155	27	137	11,954	451	--	134	310	--	424	437	66	1,203	12	--	--
Central Unit																
Adams	38	--	--	--	--	--	--	5	--	9	4	--	20	--	--	--
Chippewa	101	--	--	2	5	--	5	8	--	7	--	1	73	--	--	--
Clark	167	--	1	--	31	--	8	16	--	10	11	12	78	--	--	--
Eau Claire	10	--	--	--	--	--	--	--	--	4	--	--	6	--	--	--
Jackson	122	--	--	--	4	--	7	7	--	7	5	9	83	--	--	--
Juneau	52	--	--	--	--	--	--	9	--	16	5	--	22	--	--	--
Marathon	357	--	9	18	47	--	7	47	--	68	75	25	61	--	--	--
Marquette	38	--	--	--	--	--	--	15	--	--	--	5	18	--	--	--
Monroe	77	--	--	--	--	--	--	--	--	5	4	5	63	--	--	--
Portage	39	--	--	--	--	--	--	9	--	16	7	--	7	--	--	--
Waupaca	187	--	2	1	12	--	6	15	--	18	20	65	40	8	--	--
Waushara	26	--	--	--	--	--	--	7	--	6	6	--	7	--	--	--
Wood	64	--	--	--	--	--	--	9	--	12	5	--	38	--	--	--
Total	1,278	--	12	21	99	--	33	147	--	178	142	122	516	8	--	--

(Table 21 continued on next page)

(Table 21 continued)

Unit and county	All species	Species group														
		White pine	Ash	Aspen	Bass-wood	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Southwest Unit																
Buffalo	281	--	--	1	22	--	--	--	--	10	25	42	181	--	--	--
Crawford	200	--	28	--	--	--	--	--	--	19	--	--	133	20	--	--
Dunn	203	--	--	--	52	--	--	--	--	9	16	--	126	--	--	--
Grant	300	--	29	--	--	--	--	--	--	28	19	5	196	23	--	--
Iowa	55	--	--	--	--	--	--	--	--	11	--	--	35	9	--	--
La Crosse	1,281	--	--	--	--	--	--	--	--	6	--	--	1,202	73	--	--
Lafayette	12	--	--	--	--	--	--	--	--	--	--	--	12	--	--	--
Pepin	49	--	--	--	--	--	--	--	--	4	--	--	45	--	--	--
Pierce	119	--	--	--	--	--	--	--	49	5	--	--	65	--	--	--
Richland	221	--	--	--	25	--	--	--	--	11	23	4	149	9	--	--
St. Croix	49	--	--	--	--	--	--	--	--	4	--	--	45	--	--	--
Sauk	230	--	--	--	5	--	--	--	--	16	27	10	158	14	--	--
Trempealeau	243	--	--	--	62	--	--	--	--	6	--	9	166	--	--	--
Vernon	323	--	--	--	5	--	--	--	--	7	22	5	260	24	--	--
Total	3,566	--	57	1	171	--	--	--	49	136	132	75	2,773	172	--	--
Southeast Unit																
Brown	24	--	--	--	--	--	--	--	--	17	7	--	--	--	--	--
Calumet	10	--	--	--	--	--	-	--	--	[illegible]	4	--	--	--	--	--
Columbia	54	--	--	--	--	--	--	[illegible]	--	--	--	--	25	10	11	--
Dane	57	--	--	--	-	--	--	--	--	--	--	--	31	12	13	--
Door	58	--	--	--	--	--	[illegible]	-	--	[illegible]	[illegible]	--	--	--	--	--
Green	8	--	--	--	--	--	--	--	--	-	--	--	[illegible]	--	--	--
Kewaunee	16	--	--	--	--	--	--	--	--	[illegible]	6	--	--	--	--	--
Manitowoc	94	--	--	--	--	--	--	--	--	17	10	--	57	--	10	--
Outagamie	100	--	--	-	--	--	--	—	[illegible]	14	8	37	7	--	--	--
Rock	7	--	--	--	--	--	--	--	--	--	--	--	7	--	--	--
Washington	8	--	--	--	--	--	--	[illegible]	--	--	--	--	--	--	--	--
Winnebago	7	--	--	--	--	--	--	--	--	[illegible]	4	--	--	--	--	--
Total	443	--	--	--	--	--	[illegible]	23	34	97	54	37	135	23	34	--
State total	27,250	44	290	12,971	1,042	4	441	1,291	83	1,988	2,321	511	5,939	244	34	47

Table 22.--Veneer log receipts in Wisconsin by area of origin for selected years, 1946-1981

(In thousand board feet)[1/]

Year	All areas	Area of origin				
		Wisconsin	Michigan	Minnesota	Other States	Canada
1946	68,116	28,813	33,834	1,139	919	3,411
1948	71,791	31,553	27,052	4,811	1,066	7,309[2/]
1950	62,935	26,198	19,917	4,919	924	10,977[2/]
1952	59,500	28,899	15,775	5,826	1,516	7,484
1954	59,573	26,527	15,537	7,962	3,286	6,261
1956	66,949	30,298	18,932	7,221	3,405	7,093
1958	43,063	23,488	8,078	7,027	916	3,554
1960	51,298	24,249	8,659	8,380	5,207	4,803
1962	37,517	18,846	4,950	6,177	2,777	4,767
1963	41,918	23,788	5,918	6,148	1,726	4,338
1965	43,104	22,547	8,044	6,111	1,621	4,781
1966	42,162	20,458	8,265	5,207	2,642	5,590
1968	37,571	18,853	8,001	3,518	2,679	4,520
1970	29,896	15,148	7,347	2,951	1,747	2,703
1972	36,491	18,172	10,893	3,457	1,552	2,417
1973	37,804	19,643	10,922	4,083	1,950	1,206
1974	41,605	24,294	10,221	3,486	1,905	1,699
1975	33,294	20,379	9,009	2,136	1,567	203
1976	36,971	20,752	10,280	3,033	2,412	494
1980	27,903	14,299	9,029	2,468	1,587	520
1981	34,540	14,245	14,058	2,501	3,008	728

[1/] International 1/4-inch rule.

[2/] Includes nominal quantity from other countries.

Table 23.--Veneer log receipts in Wisconsin by species group and area of origin, 1981

(In thousand board feet)[1/]

Species group	All areas	Area of origin							
		Wisconsin	Michigan	Minnesota	Iowa	Illinois	Canada	Pennsylvania	Indiana
Softwoods									
White pine	174	44	130	--	--	--	--	--	--
Total	174	44	130	--	--	--	--	--	--
Hardwoods									
Ash	590	290	156	77	10	57	--	--	--
Aspen	572	571	--	1	--	--	--	--	--
Basswood	1,575	1,042	161	305	67	--	--	--	--
Beech	67	4	63	--	--	--	--	--	--
Paper birch	576	441	78	57	--	--	--	--	--
Yellow birch	2,497	1,283	944	10	--	--	260	--	--
Cottonwood	521	83	--	438	--	--	--	--	--
Elm	2,370	1,846	424	76	--	24	--	--	--
Hard maple	12,744	2,321	10,387	18	18	--	--	--	--
Soft maple	1,179	511	613	26	29	--	--	--	--
Red oak	11,293	5,641	1,071	1,441	1,112	780	468	520	260
White oak	338	145	10	52	21	37	--	73	--
Other hardwoods	44	23	21	--	--	--	--	--	--
Total	34,366	14,201	13,928	2,501	1,257	898	728	593	260
All species	34,540	14,245	14,058	2,501	1,257	898	728	593	260

[1/] International 1/4-inch rule.

Table 24.--Fuelwood production from roundwood by species group, Forest Survey Unit and county, Wisconsin, 1981

(In standard cords, unpeeled)[1/]

Unit and county	All species	Species group											
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar	Basswood
Northeast Unit													
Florence	11,894	111	--	--	15	25	19	--	--	10	--	--	--
Forest	17,341	--	19	19	--	--	--	--	--	214	403	--	10
Langlade	35,078	--	--	--	141	--	--	--	--	1,174	2,737	--	--
Lincoln	33,695	--	--	--	454	327	204	--	--	470	4,766	--	--
Marinette	23,294	--	--	--	--	--	--	--	--	125	3,540	--	--
Menominee	14,177	--	--	--	--	--	--	--	--	60	--	--	--
Oconto	45,345	--	--	--	--	--	--	--	--	2,000	4,043	--	1,015
Oneida	63,406	134	659	5,812	2,847	2,014	1,698	324	71	131	2,813	--	5,535
Shawano	49,758	--	--	--	--	--	--	--	--	3,752	1,218	--	609
Vilas	25,864	9	6	27	136	5,455	111	39	15	357	45	--	--
Total	319,852	254	684	5,858	3,593	7,821	2,032	363	86	8,293	19,565	--	7,169
Northwest Unit													
Ashland	7,544	462	--	462	--	--	--	476	--	278	23	--	--
Barron	23,144	--	--	--	--	--	--	--	--	1,832	2,305	--	741
Bayfield	32,510	109	218	--	--	--	--	--	--	173	1,352	1	49
Burnett	31,549	--	--	--	1,026	14	12	--	--	224	307	--	--
Douglas	14,757	--	--	--	47	11	12	17	--	2,879	2,914	--	807
Iron	13,411	--	--	--	--	--	--	--	--	55	--	--	4,871
Polk	38,612	--	1309	--	--	--	--	--	--	--	632	--	--
Price	17,838	--	--	--	--	--	--	--	--	90	74	--	9
Rusk	27,663	--	873	--	139	62	148	--	--	738	419	--	--
Sawyer	14,890	--	--	--	--	--	--	--	--	534	2,094	--	--
Taylor	34,559	--	--	--	36	24	40	--	--	1,123	1,621	5	383
Washburn	13,415	--	--	--	184	34	44	--	--	59	421	2	54
Total	269,892	571	2,400	462	1,432	145	256	493	--	7,985	12,162	8	6,914
Central Unit													
Adams	49,645	--	--	--	763	75	127	--	--	316	3,222	--	231
Chippewa	51,151	--	--	--	--	--	--	--	--	3,621	3,834	--	--
Clark	15,031	--	--	--	5	--	--	--	--	2,151	11	--	50
Eau Claire	51,490	--	--	--	--	--	--	--	--	500	21	--	--
Jackson	22,197	--	--	--	--	--	--	--	--	--	24	--	--
Juneau	33,925	--	582	--	2,524	74	187	--	--	652	1,423	--	95
Marathon	89,517	--	--	--	674	228	925	--	--	12,380	3,669	--	99
Marquette	33,684	--	--	--	433	48	171	--	--	473	710	--	--
Monroe	25,268	--	--	--	1	--	--	--	--	500	3,402	--	--
Portage	17,775	111	--	--	--	--	--	--	--	759	4,537	--	--
Waupaca	27,973	--	--	--	19	7	24	--	--	2,133	--	--	--
Waushara	35,503	--	--	--	1374	351	934	--	--	--	128	--	--
Wood	40,114	--	--	--	59	4	12	--	--	--	15,042	--	--
Total	493,273	111	582	--	5,852	787	2,380	--	--	23,485	36,023	--	475

(Table 24 continued on next page)

[1/] 128 cubic feet, consisting of 70 cubic feet of wood and 58 cubic feet of bark and air space.

(Table 24 continued)

Unit and county	All species	Species group											
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar	Basswood
Southwest Unit													
Buffalo	10,056	--	--	--	--	--	--	--	--	--	607	--	405
Crawford	6,419	--	--	--	--	--	--	--	--	2	--	--	2
Dunn	38,619	--	135	--	--	--	--	--	--	7,536	4,655	--	--
Grant	56,984	--	--	--	622	610	1,197	--	--	--	4,999	--	--
Iowa	46,790	--	--	--	--	--	--	--	--	815	--	--	--
La Crosse	21,863	--	--	--	--	--	--	--	--	--	--	--	--
Lafayette	1,741	--	--	--	--	--	--	--	--	210	--	--	--
Pepin	21,047	--	--	--	--	--	--	--	--	378	1,548	--	660
Pierce	11,926	--	--	--	--	--	--	--	--	70	--	--	70
Richland	33,841	--	--	--	--	--	--	--	--	--	1,069	--	--
St. Croix	28,740	--	--	--	173	122	110	--	--	--	4,371	--	--
Sauk	48,034	--	--	--	--	--	--	--	--	414	1,756	--	841
Trempealeau	18,845	--	--	--	--	--	--	--	--	--	405	--	--
Vernon	20,398	--	--	--	--	--	--	--	--	--	--	--	--
Total	365,303	--	135	--	795	732	1,307	--	--	9,425	19,410	--	1,978
Southeast Unit													
Brown	19,784	--	--	--	--	--	--	--	510	3,861	712	--	--
Calumet	3,475	--	--	--	--	--	--	--	--	226	--	--	311
Columbia	33,683	--	--	--	6	34	12	--	--	--	315	--	1,896
Dane	47,188	--	--	--	--	--	--	--	--	852	734	--	2,445
Dodge	10,490	--	--	--	5	2	30	--	--	100	151	6	160
Door	15,267	619	291	--	--	--	--	--	--	736	--	--	783
Fond du Lac	6,314	--	--	--	--	--	--	--	--	--	257	--	--
Green	9,923	--	--	--	--	--	--	--	--	--	--	--	--
Green Lake	--	--	--	--	--	--	--	--	--	--	--	--	--
Jefferson	17,753	--	--	--	--	--	--	--	--	1,064	520	--	--
Kenosha	22,019	--	--	--	--	--	--	--	--	100	--	--	--
Kewaunee	8,084	--	--	--	--	--	--	--	--	--	--	--	--
Manitowoc	3,727	--	--	--	--	--	--	--	--	--	213	--	--
Milwaukee	12,158	715	16	84	71	24	238	8	56	297	335	39	100
Outagamie	75,656	--	--	--	2	8	6,528	--	--	8,687	6,320	121	3,603
Ozaukee	21,825	231	3	22	276	--	179	3	35	861	1,488	123	277
Racine	7,394	--	--	--	--	--	--	--	--	95	797	11	32
Rock	23,541	--	--	--	--	--	--	--	--	394	--	--	--
Sheboygan	58,617	--	--	--	--	--	--	--	--	1,272	591	--	--
Walworth	2,642	--	--	--	--	--	--	--	--	--	66	--	13
Washington	14,835	--	--	--	62	15	214	--	--	881	--	--	--
Waukesha	37,708	--	--	--	--	--	--	--	--	417	3,534	8	35
Winnebago	15,576	--	--	--	--	--	--	--	--	--	298	--	--
Total	467,659	1,565	310	106	422	83	7,201	11	601	19,843	16,331	308	9,655
State total	1,915,979	2,501	4,111	6,426	12,094	9,568	13,176	867	687	69,031	103,491	316	26,191

(Table 24 continued on next page)

(Table 24 continued)

Unit and county	Species group											
	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Northeast Unit												
Florence	--	822	1,391	--	4,998	--	671	27	3,487	--	--	318
Forest	--	640	495	--	12,678	--	2,032	117	478	--	--	236
Langlade	--	349	179	--	18,361	460	8,663	1,068	1,534	--	--	412
Lincoln	--	5,483	1,112	--	7,436	120	5,995	2,184	5,114	--	--	30
Marinette	--	5,746	350	--	730	--	2,021	1,790	8,216	758	--	18
Menominee	--	76	224	--	8,560	96	1,276	946	2,616	323	--	--
Oconto	1,947	11,227	1,859	--	9,714	--	5,974	4,411	3,022	133	--	--
Oneida	--	14,994	1,493	--	359	--	9,594	6,674	8,252	--	--	2
Shawano	--	2,193	1,170	--	10,693	2,625	10,192	2,399	13,967	430	--	510
Vilas	--	3,309	755	--	693	--	8,325	1,153	4,530	542	--	357
Total	1,947	44,839	9,028	--	74,222	3,301	54,743	20,769	51,216	2,186	--	1,883
Northwest Unit												
Ashland	--	145	47	--	278	--	4,587	786	--	--	--	--
Barron	--	623	106	--	3,198	12	560	167	11,416	1,889	--	295
Bayfield	--	3,997	813	--	4,297	--	10,122	2,590	7,988	799	--	2
Burnett	--	1,806	252	--	4,206	--	413	187	18,979	4,123	--	--
Douglas	--	1,449	202	--	--	--	1,171	444	4,074	730	--	--
Iron	--	675	342	--	1,953	--	4,085	1,230	166	34	--	--
Polk	--	525	92	--	25,585	--	187	49	8,333	1,900	--	--
Price	--	713	276	--	8,896	--	5,898	1,828	8	2	--	44
Rusk	--	2,818	777	--	4,653	1,453	2,400	3,521	7,986	1,676	--	--
Sawyer	--	714	196	--	1,567	--	4,735	645	3,662	693	--	50
Taylor	--	1,412	649	--	5,832	752	16,089	5,122	1,230	225	--	16
Washburn	--	1,624	295	--	480	1	1,649	656	6,527	1,378	--	7
Total	--	16,501	4,047	--	60,945	2,218	51,896	17,225	70,369	13,449	--	414
Central Unit												
Adams	--	1,286	149	--	609	52	497	1,041	32,344	8,844	--	89
Chippewa	--	2,990	859	--	6,444	48	3,580	4,416	17,389	4,696	--	3,274
Clark	--	23	--	--	7,480	--	1,506	1,209	2,019	577	--	--
Eau Claire	--	2,638	551	--	1,383	--	333	380	35,739	9,945	--	--
Jackson	--	76	2	--	11,191	--	1,091	1,210	6,773	1,830	--	--
Juneau	--	548	146	--	2,677	18	842	1,280	17,647	5,198	--	32
Marathon	--	5,633	3,698	--	33,597	414	8,775	5,765	9,945	3,044	--	671
Marquette	--	--	--	--	--	--	--	--	24,495	7,354	--	--
Monroe	--	791	172	--	2,895	--	853	908	12,332	3,414	--	--
Portage	--	825	354	--	1,172	--	1,079	961	5,998	1,811	--	168
Waupaca	--	1,368	470	--	2,986	1,605	4,364	3,789	8,450	2,309	--	449
Waushara	--	549	156	--	7,877	--	19	22	18,191	5,305	--	597
Wood	--	1,826	528	--	149	--	3,021	3,542	12,275	3,656	--	--
Total	--	18,553	7,085	--	78,460	2,137	25,960	24,523	203,597	57,983	--	5,280

(Table 24 continued on next page)

(Table 24 continued)

Unit and county	Species group											
	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Southwest Unit												
Buffalo	--	--	--	--	105	--	1,425	841	4,849	1,824	--	--
Crawford	--	--	--	--	3,188	106	869	546	1,161	439	--	106
Dunn	--	--	--	--	13,104	--	739	416	8,693	2,936	--	405
Grant	--	--	--	--	14,362	1,581	81	--	18,149	6,820	80	8,483
Iowa	--	954	18	--	10,785	--	--	--	21,536	8,045	1,409	3,228
La Crosse	--	478	9	--	3,281	244	4,994	4,072	3,027	1,143	--	4,615
Lafayette	--	--	--	--	518	--	--	--	148	55	--	810
Pepin	--	442	--	109	8,541	620	692	970	4,937	1,849	--	301
Pierce	--	--	--	607	4,511	405	621	188	3,539	1,308	--	607
Richland	--	1,125	33	--	21,331	--	1,856	603	5,676	2,148	--	--
St. Croix	--	298	6	--	12,913	--	281	124	6,547	2,480	--	1,315
Sauk	--	1,492	23	118	14,852	844	1,007	860	17,889	6,691	--	1,247
Trempealeau	--	--	--	--	4,048	--	--	--	10,470	3,922	--	--
Vernon	--	--	--	--	12,795	--	--	--	5,325	1,974	--	304
Total	--	4,789	89	834	124,334	3,800	12,565	8,620	111,946	41,634	1,489	21,421
Southeast Unit												
Brown	--	1,384	426	--	10,726	--	428	157	664	482	--	434
Calumet	--	--	--	--	1,050	--	82	32	1,049	725	--	--
Columbia	--	--	--	4	946	--	75	30	17,965	12,026	--	374
Dane	--	--	--	--	3,152	282	5,107	1,354	19,198	12,407	--	1,657
Dodge	18	26	4	508	5,345	30	124	74	2,013	1,489	4	401
Door	881	6,623	1,071	--	1,198	--	1,346	454	629	502	--	134
Fond du Lac	--	272	64	--	731	158	641	305	863	597	--	2,426
Green	--	--	--	789	6,080	--	807	244	620	431	163	789
Green Lake	--	--	--	--	--	--	--	--	--	--	--	--
Jefferson	--	71	20	--	2,294	495	1,479	550	1,457	1,024	--	8,779
Kenosha	--	--	--	--	1,795	--	4,956	1,417	8,062	5,689	--	--
Kewaunee	--	319	75	--	7,293	--	75	25	170	127	--	--
Manitowoc	--	--	--	--	1,705	--	204	84	194	144	--	1,183
Milwaukee	111	283	57	21	5,325	110	1,456	604	505	365	11	1,327
Outagamie	273	1,218	349	178	28,440	556	7,450	4,019	2,012	1,457	--	4,435
Ozaukee	155	1,700	321	49	2,254	384	3,759	1,927	3,042	2,212	3	2,521
Racine	22	85	17	7	179	1,692	201	100	2,152	1,557	3	444
Rock	--	--	--	--	2,410	276	1,360	731	9,824	6,423	--	2,123
Sheboygan	--	--	--	--	41,508	89	1,720	640	6,290	4,320	--	2,187
Walworth	--	--	--	--	118	53	88	30	1,220	857	--	197
Washington	--	150	47	500	5,737	--	821	353	2,075	1,533	--	2,447
Waukesha	16	757	111	11	7,008	2,803	1,277	666	7,854	5,511	7	7,693
Winnebago	--	525	141	--	5,330	--	--	--	1,497	1,063	--	6,722
Total	1,476	13,413	2,703	2,067	140,624	6,928	33,456	13,796	89,355	60,941	191	46,273
State total	3,423	98,095	22,952	2,901	478,585	18,384	178,620	84,933	526,483	176,193	1,680	75,271

Table 25.--Production of poles, piling, posts, and miscellaneous roundwood products[1/] by Forest Survey Unit, county and species group, Wisconsin, 1981

(In thousand cubic feet)

County	All species	Species group								
		Cedar	Red pine	Aspen	Paper birch	Hard maple	Soft maple	Red oak	White oak	Other hardwoods
NORTHEAST UNIT										
Forest	94	93	1	--	--	--	--	--	--	--
Marinette	21	21	--	--	--	--	--	--	--	--
Oconto	5	--	5	--	--	--	--	--	--	--
Oneida	16	3	13	--	--	--	--	--	--	--
Shawano	289	269	--	--	--	10	10	--	--	--
Total	425	386	19	--	--	10	10	--	--	--
NORTHWEST UNIT										
Barron	366	--	366	--	--	--	--	--	--	--
Bayfield	8	--	8	--	--	--	--	--	--	--
Burnett	78	--	78	--	--	--	--	--	--	--
Douglas	14	--	14	--	--	--	--	--	--	--
Polk	10	--	10	--	--	--	--	--	--	--
Price	863	863	--	--	--	--	--	--	--	--
Sawyer	21	21	--	--	--	--	--	--	--	--
Taylor	22	22	--	--	--	--	--	--	--	--
Washburn	5	--	5	--	--	--	--	--	--	--
Total	1,387	906	481	--	--	--	--	--	--	--
CENTRAL UNIT										
Adams	42	--	--	--	--	--	--	--	--	42
Chippewa	424	--	424	--	--	--	--	--	--	--
Eau Claire	31	--	--	20	2	--	6	--	--	3
Jackson	45	--	--	41	1	--	2	--	--	1
Juneau	2	--	--	--	--	--	--	--	2	--
Marathon	5	--	--	5	--	--	--	--	--	--
Monroe	3	--	--	--	--	--	--	--	3	--
Portage	84	--	--	--	--	--	--	9	75	--
Waupaca	1	1	--	--	--	--	--	--	--	--
Waushara	2	--	--	--	--	--	--	1	1	--
Total	639	1	424	66	3	--	8	10	81	46
SOUTHWEST UNIT										
Buffalo	294	--	--	197	14	--	55	--	--	28
Crawford	86	--	--	--	--	--	--	6	80	--
Dunn	1,134	--	1,134	--	--	--	--	--	--	--
Grant	30	--	--	--	--	--	--	--	30	--
Iowa	3	--	--	--	--	--	--	--	3	--
La Crosse	184	--	--	159	1	--	4	2	16	2
Lafayette	7	--	--	--	--	--	--	--	7	--
Richland	25	--	--	--	--	--	--	--	25	--
Sauk	147	--	--	--	--	--	--	--	147	--
Trempealeau	315	--	--	213	17	--	55	--	--	30
Vernon	11	--	--	--	--	--	--	--	11	--
Total	2,236	--	1,134	569	32	--	114	8	319	60
SOUTHEAST UNIT										
Columbia	14	--	--	--	--	--	--	--	3	11
Dane	409	--	--	--	--	--	--	6	56	347
Door	81	81	--	--	--	--	--	--	--	--
Green	3	--	--	--	--	--	--	--	3	--
Manitowoc	65	65	--	--	--	--	--	--	--	--
Ozaukee	85	85	--	--	--	--	--	--	--	--
Rock	4	--	--	--	--	--	--	--	4	--
Total	661	231	--	--	--	--	--	6	66	358
State total	5,348	1,524	2,058	635	35	10	132	24	466	464

[1/] Includes cooperage logs, charcoal bolts, and shavings bolts.

Table 26.--Output of roundwood products by type of product and species group, Wisconsin, 1981

(In thousand cubic feet)

Species group	All products	Product					
		Pulpwood	Saw logs	Fuelwood	Veneer logs	Posts	Other products
Softwoods							
Cedar	2,121	--	424	173	--	1,510	14
Balsam fir	9,613	8,249	1,079	285	--	--	--
Hemlock	4,249	2,285	1,514	450	--	--	--
Jack pine	19,023	17,125	1,056	842	--	--	--
Red pine	19,493	14,287	2,482	666	--	1,931	127
White pine	8,821	1,676	6,220	920	5	--	--
Spruce	2,868	2,150	658	60	--	--	--
Tamarack	453	389	17	47	--	--	--
Total	66,641	46,161	13,450	3,443	5	3,441	141
Hardwoods							
Ash	9,938	2,969	2,108	4,819	42	--	--
Aspen	99,551	76,238	13,331	7,238	2,109	152	483
Balsam poplar	240	49	168	23	--	--	--
Basswood	8,228	1,241	4,993	1,828	166	--	--
Beech	721	2	479	240	--	--	--
Paper birch	18,921	10,333	1,627	6,859	67	--	35
Yellow birch	4,847	2,221	825	1,596	205	--	--
Cottonwood	450	2	235	199	14	--	--
Elm	47,026	5,586	7,637	33,490	313	--	--
Hickory	1,682	39	362	1,281	--	--	--
Hard maple	30,038	9,371	7,795	12,487	375	--	10
Soft maple	14,460	5,016	3,304	5,928	80	--	132
Red oak	65,841	4,797	23,219	36,836	965	23	1
White oak	20,189	1,338	6,028	12,321	36	345	121
Walnut	245	--	123	117	5	--	--
Other hardwoods	6,318	285	310	5,252	7	400	64
Total	328,695	119,487	72,544	130,514	4,384	920	846
All species	395,336	165,648	85,994	133,957	4,389	4,361	987

Table 27.--Logging residue generated during roundwood production by species group, Forest Survey Unit and county, Wisconsin, 1981

(In thousand cubic feet)

Unit and county	All species	Species group											
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar	Basswood
Northeast Unit													
Florence	2,141	1	122	55	26	49	32	47	3	20	1,117	--	54
Forest	6,080	33	541	107	21	117	64	172	3	76	2,422	--	185
Langlade	3,709	6	155	32	7	73	15	26	3	118	1,596	--	156
Lincoln	3,590	--	81	11	37	112	63	21	7	154	1,718	--	185
Marinette	6,422	20	287	96	405	215	129	101	3	75	3,564	16	109
Menominee	2,958	1	--	529	69	6	294	--	--	26	701	--	167
Oconto	2,899	14	48	27	263	199	31	14	--	41	1,393	9	58
Oneida	5,622	10	495	18	190	272	185	115	12	83	2,580	--	72
Shawano	2,374	89	3	48	29	115	50	--	1	97	522	--	141
Vilas	3,516	1	168	21	171	164	184	60	--	22	1,627	--	22
Total	39,311	175	1,900	944	1,218	1,322	1,047	556	32	712	17,240	25	1,149
Northwest Unit													
Ashland	3,726	5	278	10	116	190	105	90	14	90	1,472	--	57
Barron	754	--	--	--	2	56	27	--	--	20	150	--	47
Bayfield	5,327	--	170	6	511	235	166	93	1	19	3,101	12	8
Burnett	1,711	--	--	--	457	61	18	--	1	8	957	--	5
Douglas	2,969	--	52	--	364	171	14	6	--	7	1,713	6	2
Iron	2,644	4	55	6	33	34	39	26	--	54	1,642	--	43
Polk	844	--	--	--	46	1	7	--	--	34	114	--	64
Price	5,115	122	121	15	27	60	72	39	24	247	1,600	--	297
Rusk	3,552	--	--	3	9	41	55	--	2	161	1,608	51	230
Sawyer	4,442	3	132	11	107	94	95	33	15	120	2,709	--	89
Taylor	2,843	4	54	13	19	80	66	10	6	128	1,191	--	77
Washburn	1,969	--	57	--	252	89	37	26	1	19	1,242	--	8
Total	35,896	138	919	69	2,443	1,112	703	323	64	937	17,499	69	927
Central Unit													
Adams	1,105	--	--	--	327	370	48	--	--	6	16	--	3
Chippewa	2,377	--	--	3	31	87	47	--	3	59	743	--	94
Clark	2,497	--	--	4	71	41	99	--	--	63	866	--	103
Eau Claire	1,202	--	--	--	204	87	89	1	--	14	149	--	11
Jackson	1,284	--	--	--	283	82	94	5	--	10	139	--	16
Juneau	1,347	--	--	--	287	110	51	--	--	12	173	--	16
Marathon	2,442	3	12	43	19	76	40	10	--	74	856	--	138
Marquette	241	--	--	--	30	45	8	--	--	1	15	--	1
Monroe	1,202	--	--	--	148	52	75	--	--	15	51	--	14
Portage	821	--	--	5	93	88	84	--	16	9	199	--	40
Waupaca	1,579	9	1	18	25	100	118	--	--	63	162	1	74
Waushara	438	--	--	--	47	184	38	--	--	12	10	--	2
Wood	1,009	--	--	--	60	38	74	1	--	31	334	--	32
Total	17,544	12	13	73	1,625	1,360	865	17	19	369	3,713	1	544

(Table 27 continued on next page)

(Table 27 continued)

Unit and county	All species	Species group											
		Cedar	Balsam fir	Hemlock	Jack pine	Red pine	White pine	Spruce	Tamarack	Ash	Aspen	Balsam poplar	Basswood
Southwest Unit													
Buffalo	1,603	--	--	--	1	--	6	--	--	14	83	8	72
Crawford	688	--	--	--	--	--	--	--	--	13	6	--	16
Dunn	1,699	--	--	--	84	312	199	--	--	35	71	--	107
Grant	809	--	--	--	--	1	--	--	--	7	6	--	32
Iowa	520	--	--	--	--	--	--	--	--	6	3	--	16
La Crosse	708	--	--	--	1	4	--	--	--	6	16	--	11
Lafayette	31	--	--	--	--	--	--	--	--	--	--	--	--
Pepin	334	--	--	--	4	5	18	--	--	7	8	--	21
Pierce	519	--	--	--	--	--	--	--	--	16	8	--	141
Richland	669	--	--	--	--	--	5	--	--	22	38	--	51
St. Croix	77	--	--	--	--	--	1	--	--	4	1	--	4
Sauk	1,291	--	--	--	36	53	8	--	--	12	55	--	46
Trempealeau	1,435	--	--	--	4	40	20	--	--	8	144	--	43
Vernon	1,302	--	--	--	--	1	7	--	--	24	29	--	51
Total	11,685	--	--	--	130	416	264	--	--	174	468	8	611
Southeast Unit													
Brown	127	1	--	--	--	9	6	--	--	7	13	2	4
Calumet	45	--	--	--	--	--	--	--	--	2	1	--	9
Columbia	405	--	--	--	6	67	7	--	--	6	3	--	11
Dane	193	--	--	--	--	--	--	--	--	--	--	--	5
Dodge	77	--	--	--	--	--	--	--	--	12	--	--	2
Door	98	23	--	4	1	1	5	--	--	4	13	4	5
Fond du Lac	34	--	--	--	--	--	--	--	--	4	--	--	4
Green	82	--	--	--	--	--	--	--	--	4	--	--	4
Green Lake	40	--	--	--	--	4	1	--	--	--	--	--	--
Jefferson	45	--	--	--	--	--	--	--	--	4	--	--	2
Kenosha	8	--	--	--	--	--	--	--	--	--	1	--	--
Kewaunee	145	14	--	6	--	--	5	--	--	14	13	5	6
Manitowoc	275	17	--	7	--	--	11	--	--	19	6	--	11
Milwaukee	9	--	--	--	--	--	--	--	--	--	--	--	--
Outagamie	226	--	--	--	--	1	2	--	--	42	42	--	12
Ozaukee	39	12	--	--	--	--	--	--	--	5	--	--	--
Racine	69	--	--	--	--	--	--	--	--	3	--	--	2
Rock	109	--	--	--	--	--	--	--	--	1	--	--	5
Sheboygan	187	--	--	--	--	--	6	--	--	23	1	--	19
Walworth	64	--	--	--	--	18	--	--	--	4	--	--	--
Washington	91	--	--	--	--	--	--	--	--	16	--	--	4
Waukesha	36	--	--	--	--	3	--	--	--	--	--	--	1
Winnebago	18	--	--	--	--	--	--	--	--	1	--	--	--
Total	2,422	67	--	17	7	103	43	--	--	171	93	11	106
All counties	106,858	392	2,832	1,103	5,423	4,313	2,922	896	115	2,363	39,013	114	3,337

(Table 27 continued on next page)

(Table 27 continued)

Unit and county	Species group											
	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Northeast Unit												
Florence	--	100	59	--	96	--	265	47	41	4	--	3
Forest	--	351	155	--	692	--	867	167	72	11	--	24
Langlade	41	179	84	--	327	4	618	161	75	6	--	27
Lincoln	4	205	50	16	202	19	333	197	167	--	--	8
Marinette	16	287	36	--	137	--	309	257	297	58	--	5
Menominee	26	12	66	--	561	6	283	105	90	6	--	10
Oconto	21	156	38	4	187	--	147	151	67	29	--	2
Oneida	--	627	77	--	116	--	323	168	257	7	--	15
Shawano	66	33	26	3	351	36	379	114	235	13	--	23
Vilas	--	468	67	--	92	--	241	64	132	10	--	2
Total	174	2,418	658	23	2,761	65	3,765	1,431	1,433	144	--	119
Northwest Unit												
Ashland	--	205	100	--	485	--	329	118	52	5	--	5
Barron	--	9	--	--	53	--	53	17	249	67	--	4
Bayfield	--	352	84	--	178	--	182	64	111	4	--	--
Burnett	--	17	--	--	16	--	16	9	100	46	--	--
Douglas	--	96	1	--	3	--	12	3	19	--	--	--
Iron	--	134	59	--	198	--	190	60	62	4	--	1
Polk	--	4	--	1	59	1	29	9	336	139	--	--
Price	37	391	124	--	883	--	582	265	177	26	--	6
Rusk	5	189	55	--	258	2	309	145	387	35	1	6
Sawyer	5	325	42	--	107	--	285	104	143	13	--	10
Taylor	5	117	101	--	314	--	311	159	161	17	1	2
Washburn	--	73	4	--	20	--	44	28	59	9	--	1
Total	52	1,912	570	1	2,574	3	2,342	981	1,856	365	2	35
Central Unit												
Adams	--	4	1	--	10	--	8	10	227	75	--	--
Chippewa	--	79	24	--	95	1	87	86	747	191	--	--
Clark	--	74	31	--	111	--	183	112	540	193	1	5
Eau Claire	--	9	2	--	21	1	17	34	446	115	--	2
Jackson	--	14	1	--	16	5	10	18	464	125	--	2
Juneau	--	16	--	1	25	2	27	36	455	136	--	--
Marathon	11	59	67	--	212	5	270	141	375	25	--	6
Marquette	--	5	--	--	7	--	10	11	76	32	--	--
Monroe	--	9	--	--	34	15	46	24	563	156	--	--
Portage	--	7	--	--	9	--	14	24	182	50	--	1
Waupaca	9	18	4	--	107	6	143	152	403	159	--	7
Waushara	--	2	--	--	4	--	3	19	83	34	--	--
Wood	--	13	4	--	37	--	38	31	260	55	--	1
Total	20	309	134	1	688	35	856	698	4,821	1,346	1	24

(Table 27 continued on next page)

(Table 27 continued)

Unit and county	Species group											
	Beech	Paper birch	Yellow birch	Cotton-wood	Elm	Hickory	Hard maple	Soft maple	Red oak	White oak	Walnut	Other hardwoods
Southwest Unit												
Buffalo	--	10	--	14	57	21	19	43	1,099	133	1	22
Crawford	--	1	--	1	25	5	32	--	466	112	7	4
Dunn	--	5	--	5	57	4	92	46	571	105	--	6
Grant	--	--	--	5	41	--	18	19	361	294	21	4
Iowa	--	--	--	--	11	5	6	2	302	163	5	1
La Crosse	--	2	--	--	16	12	9	21	516	94	--	--
Lafayette	--	--	--	--	--	--	--	--	5	26	--	--
Pepin	--	--	--	--	13	1	23	8	177	48	--	1
Pierce	--	2	--	7	62	3	118	13	124	25	--	--
Richland	--	--	--	1	24	3	105	11	302	95	7	5
St. Croix	--	--	--	--	8	--	6	4	40	5	--	4
Sauk	--	1	--	1	24	10	42	62	758	168	4	11
Trempealeau	--	11	--	4	24	11	14	39	900	154	--	19
Vernon	--	4	--	4	39	24	91	51	772	200	1	4
Total	--	36	--	42	401	99	575	319	6,393	1,622	46	81
Southeast Unit												
Brown	2	4	--	19	6	--	6	10	25	12	--	1
Calumet	--	--	--	--	2	--	10	4	7	10	--	--
Columbia	--	5	--	1	21	--	19	7	111	135	--	6
Dane	--	--	--	--	2	1	3	2	106	54	6	14
Dodge	--	--	--	1	4	--	8	4	21	20	--	5
Door	8	10	--	1	2	--	5	2	10	--	--	--
Fond du Lac	--	--	--	--	2	1	4	7	8	4	--	--
Green	--	--	--	--	4	--	3	2	37	17	7	4
Green Lake	--	--	--	--	--	--	--	--	18	17	--	--
Jefferson	--	--	--	--	--	1	5	--	12	17	--	4
Kenosha	--	--	--	1	4	--	--	--	1	1	--	--
Kewaunee	4	4	--	4	4	--	5	55	5	1	--	--
Manitowoc	7	5	--	6	4	--	19	101	49	13	--	--
Milwaukee	--	--	--	--	4	--	1	1	1	2	--	--
Outagamie	--	--	--	23	13	--	5	58	13	11	--	4
Ozaukee	--	--	--	--	--	--	--	19	2	1	--	--
Racine	--	--	--	4	4	4	6	4	22	20	--	--
Rock	--	--	--	1	7	1	5	8	42	30	5	4
Sheboygan	6	--	--	1	11	1	19	11	59	30	--	--
Walworth	--	--	--	--	--	2	3	--	20	15	2	--
Washington	--	--	--	--	2	2	16	--	33	18	--	--
Waukesha	--	--	--	1	4	--	3	4	7	13	--	--
Winnebago	--	--	--	--	1	--	--	6	4	6	--	--
Total	27	28	--	63	101	13	145	305	613	447	20	42
State total	273	4,703	1,362	130	6,525	215	7,683	3,734	15,116	3,924	69	301

Table 28.--Residue produced at primary wood-using mills by type of material, type of use and county, Wisconsin, 1981

(In thousand tons green weight)

NORTHEAST UNIT

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Florence								
Fiber products	2.31	11.53	2.30	11.31	.01	.22	--	--
Industrial fuel	.33	1.21	--	--	.33	1.21	.93	4.83
Domestic fuel	.09	.20	.09	.20	--	--	.04	.06
Miscellaneous[4]	1.05	5.27	--	--	1.05	5.27	--	--
Total	3.78	18.21	2.39	11.51	1.39	6.70	.97	4.89
Forest								
Fiber products	.98	19.11	.98	19.11	--	--	--	--
Charcoal	--	.03	--	.03	--	--	--	.01
Industrial fuel	1.49	8.99	.85	2.45	.64	6.54	.72	9.17
Domestic fuel	3.38	2.91	2.22	1.84	1.16	1.07	.64	.78
Miscellaneous[4]	.40	5.74	--	--	.40	5.74	--	--
Not used	.30	.30	.09	--	.21	.30	.04	--
Total	6.55	37.08	4.14	23.43	2.41	13.65	1.40	9.96
Langlade								
Fiber products	--	2.42	--	2.42	--	--	--	--
Industrial fuel	1.31	17.28	.83	10.11	.48	7.17	.35	5.33
Domestic fuel	3.02	4.81	1.94	3.46	1.08	1.35	.75	1.47
Miscellaneous[4]	.21	3.01	.09	1.06	.12	1.95	.04	.45
Not used	.15	1.28	.11	1.15	.04	.13	.04	.50
Total	4.69	28.80	2.97	18.20	1.72	10.60	1.18	7.75
Lincoln								
Fiber products	--	3.34	--	3.34	--	--	--	--
Industrial fuel	--	2.55	--	.42	--	2.13	--	1.59
Domestic fuel	.39	.32	.39	.32	--	--	.12	.14
Miscellaneous[4]	.21	.17	--	--	.21	.17	--	--
Not used	.02	.07	--	--	.02	.07	.04	--
Total	.62	6.45	.39	4.08	.23	2.37	.16	1.73
Marinette								
Fiber products	.47	15.28	.38	10.96	.09	4.32	--	--
Industrial fuel	8.60	20.40	5.46	11.12	3.14	9.28	2.48	10.88
Domestic fuel	1.71	5.31	1.69	5.30	.02	.01	.69	2.25
Miscellaneous[4]	.85	7.64	--	--	.85	7.64	--	--
Not used	.33	.41	.04	.34	.29	.07	.01	.14
Total	11.96	49.04	7.57	27.72	4.39	21.32	3.18	13.27

(Table 28 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulp and flakeboard mills.

[4] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1/]		Fine[2/]		Bark[3/]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Menominee								
Fiber products	.44	2.03	.44	2.03	--	--	--	--
Industrial fuel	13.38	19.39	8.30	11.51	5.08	7.88	3.71	5.70
Total	13.82	21.42	8.74	13.54	5.08	7.88	3.71	5.70
Oconto								
Fiber products	.29	8.16	.29	8.16	--	--	--	--
Industrial fuel	.04	8.46	--	2.03	.04	6.43	.04	3.87
Domestic fuel	.42	5.72	.40	5.69	.02	.03	.15	2.33
Miscellaneous[4/]	.37	4.86	--	--	.37	4.86	.09	1.15
Not used	.06	--	.04	--	.02	--	.01	--
Total	1.18	27.20	.73	15.88	.45	11.32	.29	7.35
Oneida								
Fiber products	--	13.68	--	13.68	--	--	--	--
Industrial fuel	.16	11.75	--	--	.16	11.75	--	8.41
Domestic fuel	1.11	6.56	1.11	6.56	--	--	.45	.20
Miscellaneous[4/]	.16	.01	--	--	.16	.01	--	--
Not used	.52	.03	.12	.01	.40	.02	.05	--
Total	1.95	32.03	1.23	20.25	.72	11.78	.50	8.61
Shawano								
Fiber products	2.77	32.68	2.32	29.39	.45	3.29	--	.77
Industrial fuel	.39	11.86	--	.96	.39	10.90	.44	8.90
Domestic fuel	1.27	1.23	1.24	1.23	.03	--	.40	.53
Miscellaneous[4/]	1.16	6.16	--	.01	1.16	6.15	.55	3.50
Not used	.01	.10	--	--	.01	.10	--	.07
Total	5.60	52.03	3.56	31.59	2.04	20.44	1.39	13.77
Vilas								
Fiber products	17.91	65.77	14.01	43.52	3.90	22.25	--	--
Charcoal	--	1.19	--	.43	--	.76	--	--
Industrial fuel	3.62	2.66	--	.13	3.62	2.53	5.79	18.75
Domestic fuel	.03	.01	.03	.01	--	--	--	--
Miscellaneous[4/]	.64	.14	--	.01	.64	.13	--	--
Not used	.06	.01	.03	--	.03	.01	.02	.01
Total	22.26	69.78	14.07	44.10	8.19	25.68	5.81	18.76
All counties								
Fiber products	25.17	174.00	20.72	143.92	4.45	30.08	--	.77
Charcoal	--	1.22	--	.46	--	.76	--	.01
Industrial fuel	29.32	104.55	15.44	38.73	13.88	65.82	14.46	77.43
Domestic fuel	11.42	27.07	9.11	24.61	2.31	2.46	3.24	7.76
Miscellaneous[4/]	5.05	33.00	.09	1.08	4.96	31.92	.68	5.10
Not used	1.45	2.20	.43	1.50	1.02	.70	.21	.72
Total	72.41	342.04	45.79	210.30	26.62	131.74	18.59	91.79

(Table 28 continued on next page)

[1/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3/] Does not include bark at pulp and flakeboard mills.

[4/] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

NORTHWEST UNIT

County and type of use	Wood residue: Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Ashland								
Fiber products	27.96	13.60	27.96	13.60	--	--	.01	.07
Industrial fuel	.92	21.06	.13	6.84	.79	14.22	9.98	10.66
Domestic fuel	3.02	.16	3.02	.16	--	--	.17	.03
Miscellaneous[4]	17.33	4.54	--	--	17.33	4.54	--	--
Not used	.11	.04	--	--	.11	.04	1.10	.05
Total	49.34	39.40	31.11	20.60	18.23	18.80	11.26	10.81
Barron								
Fiber products	--	6.68	--	4.69	--	1.99	--	--
Industrial fuel	--	5.18	--	3.59	--	1.59	.01	6.37
Domestic fuel	.27	9.07	.26	3.07	.01	6.00	.09	.20
Miscellaneous[4]	.17	2.94	.02	.04	.15	2.90	.02	.04
Total	.44	23.87	.28	11.39	.16	12.48	.12	6.61
Bayfield								
Fiber products	--	.14	--	.14	--	--	--	--
Industrial fuel	--	2.06	--	1.25	--	.81	--	.59
Domestic fuel	.93	.42	.93	.42	--	--	.39	.18
Miscellaneous[4]	.01	--	--	--	.01	--	--	--
Not used	.68	.77	.11	.34	.57	.43	.04	.15
Total	1.62	3.39	1.04	2.15	.58	1.24	.43	.92
Burnett								
Charcoal	.02	5.28	.02	4.99	--	.29	.01	2.12
Industrial fuel	.13	.05	.12	.05	.01	--	.49	.02
Domestic fuel	.25	.13	.25	.13	--	--	.11	.05
Miscellaneous[4]	.12	2.64	--	--	.12	2.64	--	--
Not used	.20	.08	.07	--	.13	.08	.03	--
Total	.72	8.18	.46	5.17	.26	3.01	.64	2.19
Douglas								
Fiber products	1.32	--	1.32	--	--	--	--	--
Industrial fuel	1.20	1.97	.18	.92	1.02	1.05	.46	.39
Domestic fuel	.35	.92	.35	.92	--	--	.14	.39
Miscellaneous[4]	.08	.10	.07	.06	.01	.04	--	.03
Not used	.42	.13	.21	.07	.21	.06	.07	.03
Total	3.37	3.12	2.13	1.97	1.24	1.15	.67	.84
Iron								
Fiber products	--	.32	--	.20	--	.12	--	--
Industrial fuel	--	--	--	--	--	--	--	.09
Miscellaneous[4]	.02	--	.01	--	.01	--	--	--
Not used	.05	--	.03	--	.02	--	.01	--
Total	.07	.32	.04	.20	.03	.12	.01	.09

(Table 28 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulp and flakeboard mills.

[4] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Polk								
Fiber products	.14	5.98	.14	5.98	--	--	--	--
Charcoal	.03	3.30	.03	3.30	--	--	.01	1.40
Industrial fuel	.14	3.17	.12	.71	.02	2.46	.08	2.46
Domestic fuel	.16	.53	.15	.43	.01	.10	.06	.19
Miscellaneous[4]	.22	3.47	--	--	.22	3.47	.02	.37
Not used	.06	.07	.02	.03	.04	.04	.01	.01
Total	.75	16.52	.46	10.45	.29	6.07	.18	4.43
Price								
Fiber products	.47	8.43	.47	6.32	--	2.11	--	--
Industrial fuel	.46	24.40	.11	13.98	.35	10.42	.22	8.51
Domestic fuel	.39	2.67	.39	2.67	--	--	.11	.76
Miscellaneous[4]	.26	1.33	--	--	.26	1.33	--	--
Not used	.10	.92	.10	.90	--	.02	.08	.77
Total	1.68	37.75	1.07	23.87	.61	13.88	.41	10.04
Rusk								
Fiber products	--	6.74	--	6.02	--	.72	--	--
Industrial fuel	--	--	--	--	--	--	--	2.56
Domestic fuel	.16	.39	.16	.39	--	--	.05	.13
Miscellaneous[4]	.10	3.92	--	--	.10	3.92	--	--
Not used	.09	1.95	.06	1.81	.03	.14	.03	.80
Total	.35	13.00	.22	8.22	.13	4.78	.08	3.49
Sawyer								
Fiber products	.10	2.89	.10	2.57	--	.32	.04	.01
Industrial fuel	--	2.33	--	.90	--	1.43	--	1.58
Domestic fuel	1.07	1.45	1.07	1.45	--	--	.45	.50
Miscellaneous[4]	.28	.62	--	.02	.28	.60	--	.01
Not used	.48	.55	.06	--	.42	.55	.02	--
Total	1.93	7.84	1.23	4.94	.70	2.90	.51	2.10
Taylor								
Fiber products	--	.18	--	--	--	.18	--	--
Industrial fuel	3.35	1.08	1.21	.39	2.14	.69	.52	.17
Domestic fuel	3.06	2.94	3.06	2.94	--	--	1.18	.79
Miscellaneous[4]	.46	1.14	--	--	.46	1.14	.08	.02
Not used	.18	.12	.17	.11	.01	.01	.09	.47
Total	7.05	5.46	4.44	3.44	2.61	2.02	1.87	1.45

(Table 28 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulp and flakeboard mills.

[4] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Washburn								
Fiber products	--	3.27	--	3.27	--	--	--	--
Industrial fuel	--	5.14	--	1.40	--	3.74	--	2.29
Domestic fuel	.55	.18	.55	.18	--	--	.22	.07
Miscellaneous[4]	.50	.14	--	--	.50	.14	--	--
Not used	.46	.12	.41	.10	.05	.02	.17	.04
Total	1.51	8.85	.96	4.95	.55	3.90	.39	2.40
All counties								
Fiber products	29.99	48.23	29.99	42.79	--	5.44	.05	.08
Charcoal	.05	8.58	.05	8.29	--	.29	.02	3.52
Industrial fuel	6.20	66.44	1.87	30.03	4.33	36.41	11.76	35.69
Domestic fuel	10.21	18.86	10.19	12.76	.02	6.10	2.97	3.29
Miscellaneous[4]	19.55	20.84	.10	.12	19.45	20.72	.12	.47
Not used	2.83	4.75	1.24	3.36	1.59	1.39	1.65	2.32
Total	68.83	167.70	43.44	97.35	25.39	70.35	16.57	45.37
CENTRAL UNIT								
Adams								
Domestic fuel	.18	4.90	.18	4.90	--	--	--	--
Miscellaneous[4]	.02	.86	--	--	.02	.86	--	--
Not used	.09	2.00	--	--	.09	2.00	.08	2.08
Total	.29	7.76	.18	4.90	.11	2.86	.08	2.08
Chippewa								
Fiber products	1.31	19.49	1.12	16.77	.19	2.72	--	--
Industrial fuel	.47	9.96	--	1.85	.47	8.11	.48	7.93
Domestic fuel	.80	10.20	.80	10.13	--	.07	.30	1.56
Miscellaneous[4]	.46	7.38	--	.98	.46	6.40	.06	3.19
Total	3.04	47.03	1.92	29.73	1.12	17.30	.84	12.68
Clark								
Fiber products	--	3.02	--	3.02	--	--	--	--
Industrial fuel	--	5.04	--	2.07	--	2.97	--	2.17
Domestic fuel	1.41	12.38	1.41	11.09	--	1.29	.61	5.15
Miscellaneous[4]	.82	5.12	--	--	.82	5.12	--	--
Not used	--	.04	--	--	--	.04	--	--
Total	2.23	25.60	1.41	16.18	.82	9.42	.61	7.32

(Table 28 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulp and flakeboard mills.

[4] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Eau Claire								
Industrial fuel	.34	1.67	.34	1.67	--	--	.29	1.42
Domestic fuel	.67	1.48	.67	1.48	--	--	.03	.03
Miscellaneous[4]	.78	3.65	.34	1.67	.44	1.98	--	--
Not used	.35	.82	--	--	.35	.82	.26	.60
Total	2.14	7.62	1.35	4.82	.79	2.80	.58	2.05
Jackson								
Fiber products	--	1.74	--	1.74	--	--	--	--
Industrial fuel	--	--	--	--	--	--	--	1.40
Domestic fuel	.13	1.83	.13	1.83	--	--	.06	.04
Miscellaneous[4]	.23	2.05	.14	--	.09	2.05	--	.07
Not used	.09	.02	.01	--	.08	.02	.04	--
Total	.45	5.64	.28	3.57	.17	2.07	.10	1.51
Juneau								
Fiber products	.21	2.03	.16	2.03	.05	--	--	--
Industrial fuel	--	1.46	--	--	--	1.46	.03	1.06
Domestic fuel	.22	4.76	.19	3.75	.03	1.01	.12	2.06
Miscellaneous[4]	.24	3.50	.07	.94	.17	2.56	.05	.64
Not used	.09	2.83	.06	2.50	.03	.33	.01	.16
Total	.76	14.58	.48	9.22	.28	5.36	.21	3.92
Marathon								
Fiber products	1.64	21.04	1.14	15.93	.50	5.11	--	--
Industrial fuel	1.20	3.14	1.14	1.83	.06	1.31	.83	6.96
Domestic fuel	1.42	3.52	1.42	3.44	--	.08	.44	.61
Miscellaneous[4]	1.59	6.28	--	.28	1.59	6.00	.16	1.52
Not used	.02	--	--	--	.02	--	.02	.03
Total	5.87	33.98	3.70	21.48	2.17	12.50	1.45	9.12
Marquette								
Domestic fuel	.26	.29	.26	.29	--	--	.11	.12
Miscellaneous[4]	.19	.18	--	--	.19	.18	--	--
Not used	.07	.03	.07	.03	--	--	.03	.01
Total	.52	.50	.33	.32	.19	.18	.14	.13
Monroe								
Domestic fuel	.21	1.16	.21	1.16	--	--	.09	.49
Miscellaneous[4]	2.42	5.79	1.45	3.26	.97	2.53	.62	1.39
Not used	--	.06	--	.01	--	.05	--	--
Total	2.63	7.01	1.66	4.43	.97	2.58	.71	1.88

(Table 28 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulp and flakeboard mills.

[4] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Portage								
Fiber products	.35	2.97	.09	2.61	.26	.36	--	--
Industrial fuel	.03	.13	.02	--	.01	.13	.04	1.02
Domestic fuel	1.56	2.32	1.56	2.32	--	--	.66	.99
Miscellaneous[4]	.75	2.38	.03	--	.72	2.38	.02	.09
Total	2.69	7.80	1.70	4.93	.99	2.87	.72	2.10
Waupaca								
Fiber products	1.05	11.42	1.05	11.42	--	--	--	--
Charcoal	.02	.58	--	--	.02	.58	--	--
Industrial fuel	.29	5.06	.01	.02	.28	5.04	.24	3.89
Domestic fuel	.17	.36	.17	.36	--	--	.07	.16
Miscellaneous[4]	.30	2.42	--	--	.30	2.42	.20	1.59
Not used	.13	.87	.01	--	.12	.87	.01	--
Total	1.96	20.71	1.24	11.80	.72	8.91	.52	5.64
Waushara								
Industrial fuel	--	--	--	--	--	--	.18	.74
Domestic fuel	.77	2.85	.77	2.85	--	--	.03	.46
Miscellaneous[4]	.46	1.63	--	--	.46	1.63	.13	.01
Not used	.04	.06	.03	.03	.01	.03	.01	.01
Total	1.27	4.54	.80	2.88	.47	1.66	.35	1.22
Wood								
Fiber products	4.17	15.19	4.17	13.70	--	1.49	--	--
Industrial fuel	.46	1.42	.46	1.42	--	--	--	.68
Domestic fuel	.69	.78	.69	.78	--	--	.15	.21
Miscellaneous[4]	3.12	8.71	--	--	3.12	8.71	2.00	6.03
Not used	--	--	--	--	--	--	.13	.12
Total	8.44	26.10	5.32	15.90	3.12	10.20	2.28	7.04
All counties								
Fiber products	8.73	76.90	7.73	67.22	1.00	9.68	--	--
Charcoal	.02	.58	--	--	.02	.58	--	--
Industrial fuel	2.79	27.88	1.97	8.86	.82	19.02	2.09	27.27
Domestic fuel	8.49	46.83	8.46	44.38	.03	2.45	2.67	11.88
Miscellaneous[4]	11.38	49.95	2.03	7.13	9.35	42.82	3.24	14.53
Not used	.88	6.73	.18	2.57	.70	4.16	.59	3.01
Total	32.29	208.87	20.37	130.16	11.92	78.71	8.59	56.69

(Table 28 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulp and flakeboard mills.

[4] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

SOUTHWEST UNIT

County and type of use	Wood residue: Total		Coarse[1/]		Fine[2/]		Bark[3/]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Buffalo								
Fiber products	.05	9.77	.05	7.69	--	2.08	--	1.53
Industrial fuel	.04	7.96	--	2.86	.04	5.10	.03	4.95
Domestic fuel	.02	7.97	.02	7.97	--	--	--	.39
Miscellaneous[4/]	--	4.48	--	.71	--	3.77	--	1.14
Not used	--	.25	--	--	--	.25	--	.18
Total	.11	30.43	.07	19.23	.04	11.20	.03	8.19
Crawford								
Fiber products	--	7.35	--	4.53	--	2.82	--	--
Industrial fuel	--	6.98	--	6.98	--	--	--	4.20
Domestic fuel	--	2.96	--	2.96	--	--	--	.07
Miscellaneous[4/]	--	5.70	--	--	--	5.70	--	1.39
Not used	--	1.55	--	.24	--	1.31	--	.83
Total	--	24.54	--	14.71	--	9.83	--	6.49
Dunn								
Fiber products	.04	2.25	.04	2.25	--	--	.02	.96
Industrial fuel	.74	8.37	.70	7.05	.04	1.32	.33	3.80
Domestic fuel	3.57	4.32	3.55	4.21	.02	.11	.26	.67
Miscellaneous[4/]	2.42	6.45	--	--	2.42	6.45	.25	.06
Not used	--	.03	--	.03	--	--	.98	.26
Total	6.77	21.42	4.29	13.54	2.48	7.88	1.84	5.75
Grant								
Fiber products	--	7.70	--	7.70	--	--	--	.15
Domestic fuel	--	3.79	--	3.79	--	--	--	.36
Miscellaneous[4/]	.01	9.80	--	2.08	.01	7.72	--	5.15
Not used	.01	.41	.01	.14	--	.27	.01	.20
Total	.02	21.70	.01	13.71	.01	7.99	.01	5.86
Iowa								
Domestic fuel	--	4.43	--	4.43	--	--	--	--
Miscellaneous[4/]	--	2.61	--	.01	--	2.60	--	1.85
Not used	--	--	--	--	--	--	--	.05
Total	--	7.04	--	4.44	--	2.60	--	1.90
Lacrosse								
Fiber products	--	29.88	--	28.86	--	1.02	--	--
Industrial fuel	--	18.98	--	2.69	--	16.29	--	13.34
Domestic fuel	--	1.98	--	1.98	--	--	--	.84
Miscellaneous[4/]	--	2.21	--	--	--	2.21	--	.07
Total	--	53.05	--	33.53	--	19.52	--	14.25

(Table 28 continued on next page)

[1/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3/] Does not include bark at pulp and flakeboard mills.

[4/] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Lafayette								
Domestic fuel	.02	.05	.02	.05	--	--	--	.01
Miscellaneous[4]	.01	.02	--	--	.01	.02	--	--
Not used	--	.01	--	--	--	.01	.01	.01
Total	.03	.08	.02	.05	.01	.03	.01	.02
Pepin								
Fiber products	.51	6.01	.51	5.02	--	.99	--	--
Charcoal	--	2.11	--	2.11	--	--	--	.90
Industrial fuel	.06	--	.06	--	--	--	.24	1.91
Domestic fuel	.01	1.67	.01	1.67	--	--	--	.61
Miscellaneous[4]	.32	4.14	--	--	.32	4.14	--	.34
Total	.90	13.93	.58	8.80	.32	5.13	.24	3.76
Pierce								
Fiber products	--	1.60	--	1.60	--	--	--	--
Industrial fuel	--	1.58	--	.89	--	.69	--	.63
Domestic fuel	.01	2.77	.01	2.77	--	--	.01	.07
Miscellaneous[4]	.01	2.38	--	--	.01	2.38	--	1.55
Not used	--	--	--	--	--	--	--	--
Total	.02	8.33	.01	5.26	.01	3.07	.01	2.25
Richland								
Fiber products	--	4.85	--	4.85	--	--	--	--
Industrial fuel	--	.45	--	--	--	.45	--	--
Domestic fuel	.09	2.81	.06	2.81	.03	--	.02	.24
Miscellaneous[4]	--	4.02	--	--	--	4.02	--	3.02
Total	.09	12.13	.06	7.66	.03	4.47	.02	3.26
St. Croix								
Domestic fuel	--	.06	--	.04	--	.02	--	.02
Miscellaneous[4]	--	.07	--	.05	--	.02	--	.02
Total	--	.13	--	.09	--	.04	--	.04
Sauk								
Fiber products	--	1.75	--	1.75	--	--	--	--
Industrial fuel	--	.36	--	--	--	.36	--	--
Domestic fuel	.13	7.66	.13	7.66	--	--	--	1.59
Miscellaneous[4]	.08	13.10	--	5.05	.08	8.05	.06	4.58
Not used	--	.01	--	--	--	.01	--	--
Total	.21	22.88	.13	14.46	.08	8.42	.06	6.17

(Table 28 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulp and flakeboard mills.

[4] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1/]		Fine[2/]		Bark[3/]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Trempealeau								
Fiber products	--	2.53	--	2.53	--	--	--	--
Industrial fuel	.05	7.12	.04	3.48	.01	3.64	.01	4.07
Domestic fuel	.03	8.87	.03	8.87	--	--	--	3.61
Miscellaneous[4/]	.02	5.03	.01	.01	.01	5.02	--	1.06
Not used	--	--	--	--	--	--	--	.14
Total	.10	23.55	.08	14.89	.02	8.66	.01	8.88
Vernon								
Fiber products	--	3.25	--	3.25	--	--	--	--
Domestic fuel	.03	2.59	.03	2.57	--	.02	.01	.94
Miscellaneous[4/]	.01	3.05	--	--	.01	3.05	--	1.54
Not used	.01	.28	--	--	.01	.28	--	--
Total	.05	9.17	.03	5.82	.02	3.35	.01	2.48
All counties								
Fiber products	.60	76.94	.60	70.03	--	6.91	.02	2.64
Charcoal	--	2.11	--	2.11	--	--	--	.90
Industrial fuel	.89	51.80	.80	23.95	.09	27.85	.61	32.90
Domestic fuel	3.91	51.93	3.86	51.78	.05	.15	.30	9.42
Miscellaneous[4/]	2.88	63.06	.01	7.91	2.87	55.15	.31	21.77
Not used	.02	2.54	.01	.41	.01	2.13	1.00	1.67
Total	8.30	248.38	5.28	156.19	3.02	92.19	2.24	69.30
SOUTHEAST UNIT								
Brown								
Fiber products	.20	1.30	.20	1.30	--	--	--	--
Industrial fuel	--	.21	--	.08	--	.13	--	.06
Miscellaneous[4/]	.12	.76	--	--	.12	.76	.07	.54
Total	.32	2.27	.20	1.38	.12	.89	.07	.60
Calumet								
Domestic fuel	.01	.19	.01	.19	--	--	--	.08
Miscellaneous[4/]	.01	.11	--	--	.01	.11	--	--
Total	.02	.30	.01	.19	.01	.11	--	.08
Columbia								
Domestic fuel	.02	.19	.02	.19	--	--	--	.09
Miscellaneous[4/]	--	.09	--	--	--	.09	--	--
Not used	--	.02	--	--	--	.02	--	--
Total	.02	.30	.02	.19	--	.11	--	.09

(Table 28 continued on next page)

[1/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3/] Does not include bark at pulp and flakeboard mills.

[4/] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Dane								
Industrial fuel	--	.80	--	.80	--	--	--	.43
Domestic fuel	.08	1.09	.08	1.09	--	--	.03	.37
Miscellaneous[4]	.05	1.09	--	--	.05	1.09	--	--
Total	.13	2.98	.08	1.89	.05	1.09	.03	.80
Dodge								
Domestic fuel	.01	.07	.01	.07	--	--	--	.01
Miscellaneous[4]	--	.04	--	--	--	.04	--	.03
Not used	--	--	--	--	--	--	--	--
Total	.01	.11	.01	.07	--	.04	--	.04
Door								
Domestic fuel	.24	.15	.24	.15	--	--	.07	.05
Miscellaneous[4]	.13	.08	.03	.04	.10	.04	.01	.02
Not used	.04	.05	--	--	.04	.05	--	--
Total	.41	.28	.27	.19	.14	.09	.08	.07
Fond du Lac								
Domestic fuel	.01	.02	.01	.02	--	--	--	.02
Miscellaneous[4]	--	.04	--	.01	--	.03	--	.01
Total	.01	.06	.01	.03	--	.03	--	.03
Green								
Industrial fuel	--	.13	--	.13	--	--	--	--
Domestic fuel	--	.62	--	.62	--	--	--	.33
Miscellaneous[4]	--	.47	--	--	--	.47	--	--
Not used	--	.26	--	.19	--	.07	--	.08
Total	--	1.48	--	.94	--	.54	--	.41
Green Lake								
Domestic fuel	--	.07	--	.07	--	--	--	--
Miscellaneous[4]	--	.04	--	--	--	.04	--	--
Not used	--	.01	--	.01	--	--	--	.03
Total	--	.12	--	.08	--	.04	--	.03
Jefferson								
Domestic fuel	--	.10	--	.10	--	--	--	.04
Miscellaneous[4]	--	.06	--	--	--	.06	--	--
Not used	--	--	--	--	--	--	--	--
Total	--	.16	--	.10	--	.06	--	.04

(Table 28 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulp and flakeboard mills.

[4] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1]		Fine[2]		Bark[3]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Kewaunee								
Fiber products	.47	7.14	.47	7.14	--	--	--	--
Industrial fuel	.08	1.26	.02	.38	.06	.88	.15	1.90
Domestic fuel	.28	.43	.28	.43	--	--	.09	.18
Miscellaneous[4]	.39	3.76	--	--	.39	3.76	.04	1.11
Not used	--	--	--	--	--	--	--	.16
Total	1.22	12.59	.77	7.95	.45	4.64	.28	3.35
Manitowoc								
Fiber products	.07	.30	.07	.30	--	--	--	--
Industrial fuel	--	3.18	--	1.22	--	1.96	--	.89
Domestic fuel	.22	.51	.22	.51	--	--	.04	.08
Miscellaneous[4]	.48	9.08	.20	5.44	.28	3.64	.13	2.56
Total	.77	13.07	.49	7.47	.28	5.60	.17	3.53
Outagamie								
Fiber products	1.62	8.54	1.62	8.54	--	--	--	--
Industrial fuel	.73	.24	.73	.11	--	.13	.99	2.59
Domestic fuel	.09	.38	.09	.38	--	--	.04	.15
Miscellaneous[4]	1.42	5.18	--	--	1.42	5.18	--	1.09
Not used	--	--	--	--	--	--	--	--
Total	3.86	14.34	2.44	9.03	1.42	5.31	1.03	3.83
Ozaukee								
Domestic fuel	--	.03	--	.03	--	--	--	--
Miscellaneous[4]	--	.02	--	--	--	.02	--	--
Not used	--	--	--	--	--	--	--	.01
Total	--	.05	--	.03	--	.02	--	.01
Racine								
Domestic fuel	--	.35	--	.35	--	--	--	--
Miscellaneous[4]	--	.20	--	--	--	.20	--	--
Not used	--	--	--	--	--	--	--	.15
Total	--	.55	--	.35	--	.20	--	.15
Rock								
Industrial fuel	--	.07	--	.07	--	--	--	.03
Domestic fuel	--	1.29	--	1.29	--	--	--	.55
Miscellaneous[4]	--	.79	--	--	--	.79	--	--
Total	--	2.15	--	1.36	--	.79	--	.58

(Table 28 continued on next page)

[1] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3] Does not include bark at pulp and flakeboard mills.

[4] Livestock bedding, mulch, poultry litter, etc.

(Table 28 continued)

County and type of use	Wood residue							
	Total		Coarse[1/]		Fine[2/]		Bark[3/]	
	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood	Softwood	Hardwood
Sheboygan								
Industrial fuel	.01	.34	.01	.23	--	.11	--	.10
Domestic fuel	.09	.32	.09	.32	--	--	--	--
Miscellaneous[4/]	.04	.16	--	.05	.04	.11	--	--
Not used	.03	.51	.01	.24	.02	.27	.04	.26
Total	.17	1.33	.11	.84	.06	.49	.04	.36
Walworth								
Domestic fuel	--	.23	--	.23	--	--	--	.08
Miscellaneous[4/]	--	.13	--	--	--	.13	--	--
Not used	--	--	--	--	--	--	--	.01
Total	--	.36	--	.23	--	.13	--	.09
Washington								
Domestic fuel	.01	.45	.01	.45	--	--	--	.20
Miscellaneous[4/]	--	.25	--	--	--	.25	--	--
Not used	--	.02	--	--	--	.02	--	--
Total	.01	.72	.01	.45	--	.27	--	.20
Waukesha								
Domestic fuel	--	2.89	--	2.89	--	--	--	1.23
Miscellaneous[4/]	--	1.68	--	--	--	1.68	--	--
Total	--	4.57	--	2.89	--	1.68	--	1.23
Winnebago								
Domestic fuel	.05	.85	.05	.85	--	--	.01	.37
Miscellaneous[4/]	.02	.50	--	--	.02	.50	--	--
Total	.07	1.35	.05	.85	.02	.50	.01	.37
All counties								
Fiber products	2.36	17.28	2.36	17.28	--	--	--	--
Industrial fuel	.82	6.23	.76	3.02	.06	3.21	1.14	6.00
Domestic fuel	1.11	10.23	1.11	10.23	--	--	.28	3.83
Miscellaneous[4/]	2.66	24.53	.23	5.54	2.43	18.99	.25	5.36
Not used	.07	.87	.01	.44	.06	.43	.04	.70
Total	7.02	59.14	4.47	36.51	2.55	22.63	1.71	15.89
Total Wisconsin								
Fiber products	66.85	393.35	61.40	341.24	5.45	52.11	.07	3.49
Charcoal	.07	12.49	.05	10.86	.02	1.63	.02	4.43
Industrial fuel	40.02	256.90	20.84	104.59	19.18	152.31	30.06	179.29
Domestic fuel	35.14	154.92	32.73	143.76	2.41	11.16	9.46	36.18
Miscellaneous[4/]	41.52	191.38	2.46	21.78	39.06	169.60	4.60	47.23
Not used	5.25	17.09	1.87	8.28	3.38	8.81	3.49	8.42
Total	188.85	1,026.13	119.35	630.51	69.50	395.62	47.70	279.04

[1/] Suitable for chipping such as slabs, edgings, veneer cores, etc.

[2/] Not suitable for chipping such as sawdust, veneer clippings, etc.

[3/] Does not include bark at pulp and flakeboard mills.

[4/] Livestock bedding, mulch, poultry litter, etc..

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Wisconsin timber industry—an assessment of timber output trends. Resour. Bull. NC-90. St. Paul, MN: U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station; 1985. 61 p.

Discusses recent Wisconsin forest industry trends; production and receipts of pulpwood, saw logs, and veneer logs; and production of fuelwood and other timber products in 1981. Reports on logging residue, on wood and bark residue generated at primary wood-using mills, and on disposition of this mill residue.

KEY WORDS: Pulpwood, saw logs, fuelwood, veneer logs, residue.